

August 25, 2005

Robert G. Burnley
Director
Virginia Department of Environmental Quality
629 East Main Street
Richmond, Virginia 23219

Dear Mr. Burnley:

On behalf of the City of Alexandria, I hereby submit the report titled "Ambient Air Quality Analysis - Potomac River Generating Station – Alexandria, Virginia." If you have any questions, please contact me (978.443.7296) or John Britton of Schnader, Harrison, Segal and Lewis, LLP (202.419.4218).

Thank you very much.

Sincerely,


Maureen Barrett, Prof. Engr.
AERO Engineering Services

Attachment: Report (3 copies, 1 with CD)

cc: Michael G. Dowd, Enforcement Manager, Virginia Department of Environmental Quality
Kenneth L. McBee, Air Quality Modeling Coordinator, Virginia Department of Environmental Quality (copy with CD)
William Skrabak, Division Chief, Environmental Quality, City of Alexandria
John Britton, Attorney, Schnader, Harrison, Segal and Lewis, LLP

AMBIENT AIR QUALITY ANALYSIS

POTOMAC RIVER GENERATING STATION

ALEXANDRIA, VIRGINIA

Presented to:

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August 2005

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Ambient Air Quality Analysis – Potomac River Generating Station – Alexandria, Virginia

Executive Summary

This analysis calculates the air quality impacts of the Potomac River Generating Station (PRGS) in Alexandria, Virginia and compares results against health-based National and Virginia ambient air quality standards (AAQS). This analysis uses procedures prescribed by US EPA for ambient air quality analysis, and recommended by Virginia Department of Environmental Quality within written comments specific to this facility. This analysis uses AERMOD-PRIME, the most comprehensive and accurate US EPA-approved model for calculating air quality impacts from industrial complexes where downwash of plumes due to the presence of onsite and offsite structures significantly affects results. A US EPA-approved algorithm that was recently reformulated for use in AERMOD-PRIME was used to calculate the dimensions of down-washing structures.

Impacts were calculated at locations, i.e., called receptors, to which the public has access to a distance of 7.5 kilometers from the site (an extent approximately equal to the facility's significant impact area). These receptors include elevated receptors on nearby residential towers, receptors along the facility's fence line, and receptors within the City of Alexandria where residents are likely to be young, elderly or health-compromised. Results derive from application of AERMOD-PRIME using five years of local meteorological conditions and topography and surface conditions representative of the immediate and surrounding area. Emission rates primarily derive from site-specific emission rates and factors; US EPA's emission factors were used when plant-specific data were not available. Maximum short-term impacts derive from maximum potential short-term emissions from the PRGS's five boilers and its coal and ash yard operations; annual impacts for the five boilers correlate to averages of the PRGS's own historical annual emissions for the years 2002 and 2003 as reported to VADEQ.

Results show that for the criteria pollutants of PM_{2.5}, PM₁₀ and SO₂, maximum short-term impacts exceed the respective AAQS by between five and eighteen times. Areas of noncompliance are widespread and severe; for SO₂, short-term impacts exceed the AAQS by three to five times to distances beyond 600 meters from the PRGS fence line; for PM_{2.5}, short-term impacts exceed the AAQS by two or more times to a distance of 800 meters; and for PM₁₀, short-term impacts do not fall below the AAQS within 400 meters from the facility. Results indicate that violations of the AAQS are frequent; for the full area of noncompliance extending to beyond one kilometer in several directions, results show that on average, 24-hour impacts of SO₂ from the PRGS (exclusive of background) exceed the AAQS one of every six to seven days, with the average impact on that day equal to three times the AAQS. At offsite and fence line locations, 24-hour impacts of SO₂ exceed worker protection standards, indicating the potential for OSHA violations within plant boundaries.

Annual impacts based on actual historical emissions from the facility show widespread, chronic public exposure to levels in excess of the AAQS, with maximum annual impacts for NO₂, PM_{2.5}, PM₁₀ and SO₂ exceeding the AAQS by between three and twelve times. For NO₂, annual impacts exceed the AAQS to 700 meters north of Marina Towers (the most closely-located residential structure) and to 200 meters from the facility's southwest fence line. For PM_{2.5}, annual impacts exceed the AAQS by two or more times to distances up to 600 meters from the facility. For PM₁₀, areas where impacts exceed the annual standard extend to 200 meters from the facility.

Impacts of toxic air pollutants from the PRGS's main boilers were also evaluated. For the acid gases hydrogen chloride and hydrogen fluoride, maximum impacts by PRGS exceed Virginia's guideline standards. For hydrogen chloride, this exceedance is severe, at levels equal to five times the guideline standard.

This analysis shows that the PRGS's maximum impacts of CO, arsenic, cadmium, mercury and other toxic air pollutants comply with the respective AAQS and guideline levels.

1. Introduction

This report presents the procedures and results of an analysis to determine ambient air impacts of the Potomac River Generating Station (PRGS), owned and operated by Mirant Potomac River, LLC and Mirant Mid-Atlantic, LLC (collectively Mirant). It responds to the objectives of the September, 2004 "Order by Consent" (widely referred to as the "Downwash Study") mandated by the Commonwealth of Virginia State Air Pollution Control Board to Mirant Potomac River, LLC, the purpose of which is to ensure the PRGS's compliance with ambient air quality standards. This analysis uses modeling procedures prescribed by the Virginia Department of Environmental Quality (DEQ) for the "Order by Consent" in written comments,¹ and guidelines and procedures stipulated by the United States Environmental Protection Agency's (US EPA) Guideline on Air Quality Models² and New Source Review Workshop Manual.^{3,4}

In addition to the impacts of criteria pollutants that are the focus of this analysis, i.e., carbon monoxide (CO), nitrogen dioxide (NO₂), particulate matter for size categories smaller than 10 and 2.5 microns (PM₁₀ and PM_{2.5}), and sulfur dioxide (SO₂), this analysis determined maximum ambient air impacts for those toxic air pollutants (TAPs) that are emitted from the facility in relative greatest quantities. These TAPs are the acid gases of hydrogen chloride (HCl) and hydrogen fluoride (HF) and the metals of arsenic, cadmium and mercury.⁵

Results of this analysis include an assessment of the PRGS's compliance with National and DEQ Ambient Air Quality Standards (AAQS) for criteria pollutants. For TAPs, maximum impacts are assessed against DEQ's emissions standards, called significant air ambient air concentration guidelines.⁶ Table 1-1 below shows these AAQS and significant guideline values.

Table 1-1. Standards and Guidelines For Assessment of Impacts ($\mu\text{g}/\text{cu.m.}$).

National and DEQ Ambient Air Quality Standards for Criteria Pollutants.

	CO	NO2	PM2.5	PM10	SO2
1-hour	40,000 ^(d)	--	--	--	--
3-hour	--	--	--	--	1300 ^(d)
8-hour	10,000 ^(d)	--	--	--	--
24-hour	--	--	65 ^(a)	150 ^(a)	365 ^(d)
Annual	--	100 ^(c)	15 ^(b)	50	80 ^(c)

DEQ Significant Guidelines for Toxic Air Pollutants.

	HCL	HF	Arsenic	Cadmium	Mercury
1-hour	75.	41.	0.5	10.	1.25
Annual	--	--	0.02	0.4	0.05

Notes: (a) The fourth highest concentration provides an unbiased estimate of the 99th percentile value; compliance is met when fourth highest value in area is less than or equal to this value (see "User's Guide for the AMS/EPA Regulatory Model – AERMOD").

(b) Compliance is met using average of three consecutive years' values.

(c) Compliance met using highest of years' values.

(d) Compliance met using highest second highest value.

¹ Ken McBee of DEQ to Dave Shea of ENSR, February 10, 2005 and June 17, 2005.

² "Appendix W to Part 51 – Guideline on Air Quality Models," 40 CFR Ch. 1 (7-1-03 Edition).

³ "New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting," Draft, US EPA, October, 1990.

⁴ The "Order by Consent" stipulates that the "methodology for the modeling analysis shall be in accordance with EPA and DEQ methods...".

⁵ Evaluated according to their maximum potential emissions against significance guideline standards.

⁶ 9 VAC 5 Chapter 50, Hazardous Air Pollutant Sources, Part II, Emission Standards, Article 4, Emission Standards for Toxic Pollutants from Existing Sources.

2. Procedures

2.1 Facility Description

At the PRGS, each of five utility boilers provides between 90 and 105 megawatts (MW) of output power. Although recently reported values show heat input rates ranging to as high as 1107 million British thermal units (MMBtu per hour),⁷ this analysis uses heat input values reported by US EPA that range up to 1032 MMBtu per hour.⁸ Bituminous coal is combusted, and electrostatic precipitators (ESPs) provide control of particulate matter. Additional controls include combustion modification techniques to control NO₂; these have been implemented at the facility since the late 1990's.

Boiler stack locations run approximately north to south, with boiler no. 1 being the most southern-located within the PRGS boiler building. Marina Towers residential complex, with heights reaching to approximately 130 feet (39.6 meters), is located less than 150 meters to the north of the stack of boiler no. 5, the northern-most boiler. Stack heights for each of the main boilers reach to levels significantly lower than the height necessary to avoid wake effects from either this closely-located residential complex or the PRGS's own structures; each boiler's Good Engineering Practice stack height, or height necessary to avoid downwash and wake effects equals 99 meters, versus the 48.2 meter actual stack height. Therefore, for this facility, wake and downwash effects are very significant in their influence on impacts.

2.2 Model Selection

This analysis applies the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD), Version 04300, to determine the ambient air impacts by PRGS. Although AERMOD has not yet been promulgated by US EPA as a guideline model,⁹ it has been proposed as a replacement to the current most-recommended model for stationary source Prevention of Significant Deterioration (PSD) analyses (i.e., ISC3).¹⁰ AERMOD incorporates recent US EPA improvements in PSD modeling capability, including the downwash algorithm PRIME, which is an important aspect of this analysis where downwash and cavity effects dominate.¹¹

2.3 Main Boiler Emissions and Exhaust Characteristics

Stack emissions, modeling parameters and building dimensions were determined using data from the facility's Stationary Source Permit to Operate,¹² Commonwealth of Virginia Air Pollution Regulations,¹³ the facility's Title V Air Permit Application,¹⁴ data submitted to the

⁷ "Mirant Potomac River LLC Alexandria VA – A Dispersion Modeling Analysis of Downwash from Mirant's Potomac River Power Plant," ENSR Corporation, August, 2005.

⁸ "Mirant Response to City of Alexandria Data Request – Part 2," David S. Cramer of Mirant to Lalit Sharma of City of Alexandria, June 3, 2005.

⁹ "Appendix W to Part 51 – Guideline on Air Quality Models," 40 CFR Ch. 1 (7-1-03 Edition).

¹⁰ "AERMOD: Latest Features and Evaluation Results," US EPA, June, 2003.

¹¹ In an evaluation of AERMOD's capability to reproduce measured observations for seven studies where downwash effects occurred, US EPA found that for short-term results, the ratio of AERMOD with PRIME's predicted results to the corresponding highest observed concentration equaled 97% on average. "AERMOD: Latest Features and Evaluation Results," US EPA, June, 2003.

¹² "Stationary Source Permit to Operate," Commonwealth of Virginia Operating Permit, September 18, 2000.

¹³ Several Virginia air pollution regulations apply to the facility's emissions, including the standards for particulate matter and sulfur dioxide emissions.

City of Alexandria by Mirant in April and June, 2005,¹⁵ and ortho-photography of the facility and the surrounding area.¹⁶ Annual emissions and coal characteristics derive from VADEQ "Consolidated Plant Emissions Reports" for years 2000 through 2003¹⁷ and Department of Energy coal purchase records¹⁸ for the facility for years 2001, 2002 and 2003. For boiler stacks, PM_{2.5} emissions are assumed equal to PM₁₀ emissions. This assumption conforms to modeling recommendations by DEQ¹⁹ and to US EPA guidance.²⁰ Table 2-1 below summarizes some of these and other key assumptions in the calculation of emissions for the facility.

Table 2-1. Key Emission Assumptions.

PM ₁₀	Short-term impacts use maximum allowable under 9 VAC 5-40-900, "Standard for Particulate Matter." Annual emissions from boilers reflect reported actual values but add condensable portion based on sulfur and heat input characteristics from coal purchase records.
PM _{2.5}	For combustion sources, assumed all particulate emissions are PM _{2.5} .
SO ₂	For short-term rates, assumed maximum allowable under 9 VAC 5-40-930, "Standard for Sulfur Dioxide;" historical data show actual short-term values close in value to maximum allowed. ²¹
Heat Input Rate	Equivalent to US EPA's reported values (www.epa.gov/eGRID).
NO ₂	Maximum allowable for facility's boilers under federal Phase II Acid Rain permit.
Mercury	Highest average result from recent test of eight similarly-controlled bituminous-fired boilers at four electrical generating stations.
Ash Silos	Emissions consistent with standard expected rate for silo baghouses.
Rail cars	Included fugitive emissions from 65 loaded, uncovered rail cars; line extends from extreme southern end to northwest corner of site.
Coal Use Rates	Based on Department of Energy records for facility.
Coal Pile Size	Six acre coverage, as shown by ortho-photography.
Coal Process	Rail car dump, breaker, crusher at 90% control consistent with control by enclosures.

Tables 2-2 and 2-3 show maximum potential emissions of criteria pollutants (CO, NO₂, PM_{2.5}, PM₁₀ and SO₂) and TAPs (HCl, HF, arsenic, cadmium and mercury), respectively for the facility's five main boilers. These particular TAPs were selected for the focus of this analysis because their maximum impacts are expected to be greatest among all TAPs that the facility emits. Table 2-4 shows the annual pollutant emission rates for the criteria pollutants,

¹⁴ "PEPCO Potomac River Title V Air Operating Permit Application," James S. Potts, Vice President, Environmental to Alan L. Laubscher, Regional Permit Manager, January 9, 1998.

¹⁵ "Mirant Response to City of Alexaandria Data Request," April 4, 2005 and "Mirant Response to City of Alexandria Data Request – Part 2," June 3, 2005 from David S. Cramer of Mirant to Lalit Sharma of City of Alexandria; both transmittals via email.

¹⁶ "GIS Data CD," City of Alexandria, Spring, 2004.

¹⁷ Virginia Department of Environmental Quality's "Consolidated Plant Emissions Report," PRGS, years 2001, 2002 and 2003.

¹⁸ www.eia.doe.gov, November, 2004.

¹⁹ Letter, Ken McBee of Virginia DEQ to Dave Shea of ENSR, dated February 10, 2005. This assumption is also reasonable for ESP-controlled devices, where efficiency is much higher for greater particle sizes. Also, several states (New Jersey, Pennsylvania, California, with non-attainment regions for PM2.5 follow these same modeling procedures.

²⁰ "Memorandum, Implementation of New Source Review Requirements in PM_{2.5} Nonattainment Areas," Stephen D. Page, Director, March, 2005. <http://www.epa.gov/nsr/documents/nsrmemo.pdf>.

²¹ "Po River Nox SO₂ Curves," in "Mirant Response to City of Alexandria Data Request – Part 2," June 3, 2005 by email to Lalit Sharma, City of Alexandria from David S. Cramer, Mirant.

calculated using the average of reported annual values for the years 2002 and 2003. Annual emissions for the toxic air pollutants assume a capacity factor equivalent to the average load calculated using coal purchase records for the years 2002 and 2003. Table 2-5 shows the corresponding exhaust characteristics for each of the main boiler stacks.

Maximum load characteristics were used to derive short-term impacts, while annual impacts were derived using mid-load characteristics. Among the load scenarios for which characteristics are available, mid-load characteristics are assumed to most closely reflect the load scenario for annual impacts;²² for the facility, annual capacity averaged 57% for 2002 and 2003. Although a full load analysis is warranted with any additional analysis to ensure that worst-case short-term potential impacts, mid-load and minimum load emission rates for PM₁₀ were not available at the time of preparation of this analysis. Also, emission characteristics for SO₂ indicate a slight increase in efficiency for emissions at lower loads.²³ Therefore, this analysis uses the assumption that maximum load characteristics are the most likely representative load condition for maximum short-term impacts.

For PRGS, no comprehensive test data exist that are representative of the potentially wide range in metal content in bituminous coal and that are fully documented with respect to load and test conditions. Although the value reported under Toxic Release Inventory (TRI) requirements²⁴ for PRGS shows annual mercury emissions of 66 pounds, another US EPA-reported value on that agency's Air Toxic Website²⁵ shows higher annual emissions of 83 pounds. Additionally, neither the TRI nor Air Toxics Website reported values identify the corresponding facility load nor include information establishing if values are consistent with the highest potential mercury content in the fuel coal.

Several state initiatives²⁶ to control mercury from the electrical generation industry include surveys to determine actual mercury emissions from coal-fired utility boilers; these initiatives require rigorous testing procedures, including documentation of load conditions and inlet and outlet testing of mercury emissions, with multiple tests required that are separated by several months to account for potential mercury content variability in coal purchases. In the absence of similarly comprehensive test data for PRGS for mercury, this analysis uses an emission factor equivalent to the highest outlet test result from a recent study of eight bituminous pulverized coal-fired boilers at four different electrical generating stations, all using ESPs for particulate matter control.²⁷ Although use of this value may err on the side of over-prediction of impacts, its use here is meant to underscore the importance of providing test results for mercury that represent the maximum potential mercury content in the facility's coal fuel and the highest short-term heat input rates. Emissions of other toxic air pollutants derive from US EPA's "AP-42's Compilation of Air Pollutant Emission Factors" for ESP-controlled bituminous coal combustion.²⁸

²² "Mirant Response to City of Alexandria Data Request – Part 2," June 3, 2005.

²³ "Po River NOx SO2 Curves 6-03-05," submitted with "Mirant Response to City of Alexandria Data Request – Part 2," June 3, 2005.

²⁴ Toxic Release Inventory reports are required under the Superfund Authorization and Realignment Act.

²⁵ "Emissions of Mercury by Plant – 1999," www.epa.gov/ttn/atw/combust/utiltox. These results are associated with the US EPA's nation-wide Mercury Information Collection Request for power plants.

²⁶ New Jersey, Connecticut, Massachusetts and Maryland have recently proposed mercury control legislation that affects utility generators.

²⁷ Table 1, Background Document and Technical Support for Public Hearings on Proposed Amendments to 310 CRM 7.00 et seq.: 310 CMR 310 CMR 7.29 "Emission Standards for Power Plants," October, 2003.

²⁸ US EPA's AP-42, "Compilation of Air Pollutant Emission Factors," Section 1.1

Table 2-2. Five Main Boilers' Criteria Pollutant Maximum Potential Emission Rates.

Blr.	MMBtu/hr ⁽ⁱ⁾	MW ⁽ⁱ⁾	Max. Power Output	Max Fuel Rate ^(b)	Fuel Ht. Rate ^(b)	Max. Heat Input ^(a)	SO ₂			NO ₂ ^(h)			PM ₁₀ /PM _{2.5} ^(g)			CO ^(e)		
							tons/hr	MMBtu/lb ⁽ⁱ⁾	lb/hr ⁽ⁱ⁾	gps ⁽ⁱ⁾	lb/hr	gps ⁽ⁱ⁾	lb/hr ⁽ⁱ⁾	gps ⁽ⁱ⁾	lb/hr ⁽ⁱ⁾	gps ⁽ⁱ⁾		
Governing Limitations:																		
1	1032.8	90	41.6	0.0124	1569.9	197.8	464.8	58.6	123.9	15.6	916.3	115.4						
2	1032.8	90	41.6	0.0124	1569.9	197.8	464.8	58.6	123.9	15.6	916.3	115.4						
3	1022.8	105	41.2	0.0124	1554.7	195.9	460.3	58.0	122.7	15.5	907.4	114.3						
4	1022.8	105	41.2	0.0124	1554.7	195.9	460.3	58.0	122.7	15.5	907.4	114.3						
5	1022.8	105	41.2	0.0124	1554.7	195.9	460.3	58.0	122.7	15.5	907.4	114.3						

Notes:

- a. Scaled boilers from total heat input as listed on EG RID2002 Version 2.01Plant Files; values are consistent with maximum RATA result. These values are approximately six percent higher than those as listed on facility's VADEQ 2001 permit.
- b. Assumed heat input of bitu. Coal = 12,400 Btu per pound; consistent with lowest rating over years 2002, 2003 and 2004; see www.eia.doe.gov/cneaf/electricity/page/ea423.html. This value has no bearing on maximum short-term emissions.
- c. Eia.doe.gov database shows that in February, 2002 that for all of three shipments of coal sulfur content exceeded 1% (1.17, 1.02 and 1.37% S). Maximum lb/hr of SO₂ could have been violated for these periods depending on load.
- d. Uses ash content of 10.8% (highest rep'td value from coal shipments, see note 1c).
- e. Maximum short-term test result used from Mirant/ENSR protocol; converts ppm to lb per MMBtu.
- f. Uses NO_x rate of 0.45 lb/MMBtu stipulated in Acid Rain permit; Phase II NO_x Comp. Plan.
- g. Assumes that all PM10 equals PM2.5.
- h. NO₂ is not modeled for its short-term impacts; rates are shown for comparison only.
- i. MW = megawatt; MMBtu = Million Btu; lb/hour = pound per hour; gps = grams per second.

Table 2-3. Five Main Boilers' Maximum Short-term Emission Rates of Five Toxic Air Pollutants.

Max. Heat Input	Max. Power Output	Max. Fuel Rate^(g)	Hydrogen Chloride Acid Gas^(e)	Hydrogen Fluoride Acid Gas^(e)	Arsenic^(b)	Cadmium^(b)	Mercury^(a)	
Blr. MMBtu/hr	MW	tons/hr	lb/hr	gps	lb/hr	gps	lb/hr	gps
1033	90	41.6	50.0	6.3	6.2	0.8	1.71E-02	2.15E-03
2	1033	90	41.6	50.0	6.3	0.8	1.71E-02	2.12E-03
3	1023	105	41.2	49.5	6.2	0.8	1.69E-02	2.15E-03
4	1023	105	41.2	49.5	6.2	0.8	1.69E-02	2.13E-03
5	1023	105	41.2	49.5	6.2	0.8	1.69E-02	2.13E-03
Tons Per Year^(a)		<u>598</u>		<u>75</u>		<u>0.2</u>		<u>0.03</u>
Notes:				<u>0.7</u>				

- a. Chart 3 in "Background Document and Technical Support for Public Hearings on Proposed Amendments to 310 CMR 7. et seq."
- b. 310 CMR 7.29 "Emissions Standards for Power Plants, October 2003. Value for Brayton Point equals 2.0 micograms/dscfm.
- c. Table 1.1-18 in AP-42's Section 1.1 "Bituminous and Subbituminous Coal Combustion."
- d. Annual capacity factor of 57% calculated using coal purchase records for years 2002/2003.
- e. Table 1.1-15 in AP-42's Section 1.1 "Bituminous and Subbituminous Coal Combustion."
- f. "Miran Response to City of Alexandria Data Request Part 2," June 3, 2005.
- g. Assumed heat input of btu. Coal = 12,400 Btu per pound, consistent with lowest rating over years 2002, 2003 and 2004; see www.eia.doe.gov/cneaf/electricity/page/eia423.html. Short-term emission rates are based on tons per hour of fuel input, this worst-case heat rate assumption is appropriate.

Table 2-4. Five Boilers' Criteria Pollutant Annual Emission Rates.

Unit	Max. MMBtu / hr ^(e)	Max. Power Output, MW ^(e)	SO ₂ ^(b)			NO ₂ ^(b)			PM ₁₀ / PM _{2.5} ^(c,d)			CO ^(a) gps ^(e) lb/hr ^(e) tons/yr
			tons/yr	lb/hr ^(e)	gps ^(e)	tons/yr	lb/hr ^(e)	gps ^(e)	tons/yr	lb/hr ^(e)	gps ^(e)	
1	1032.8	90	2368	540.7	68.1	840	191.8	24.2	168	38.2	4.8	39
2	1032.8	90	2321	529.9	66.8	888	202.8	25.5	176	40.2	5.1	41
3	1022.8	105	3573	815.7	102.8	1348	307.8	38.8	293	66.9	8.4	55
4	1022.8	105	3383	772.5	97.3	1308	298.5	37.6	301	68.8	8.7	56
5	1022.8	105	3757	857.7	108.1	1354	309.0	38.9	314	71.6	9.0	59
Plant Totals	5134	495	15,402			5,738			1,252		249	
			MW^(e)			tons			tons		tons	

Notes:

- a. Carbon monoxide (CO) has no annual standard and is therefore not modeled on an annual basis; values are presented for reference only.
- b. Annual emissions use actual to DEQ from years 2002/2003 "Consolidated Plant Emissions Report."
- c. Annual value uses average of reported emissions for each boiler for years 2002 and 2003, but adds a non-filterable or condensable portion to total, derived from Table 1.1-5 for PC boilers without FGD controls. Condensable portion in annual rate uses weighted average value from era grid records over years 2002/2003 for S and Btu of 0.79% and 26.03 MMBtu per ton, respectively. This value of heat rate for the fuel is representative of a higher than average value but is characteristic of the fuel delivered to the facility.
- d. Assumes that all PM₁₀ equals PM_{2.5}.
- e. MMBtu = Million Btu per hour; MW = megawatts; lb/hour = pounds per hour; gps = grams per second.

Table 2-5. Stack and Flue Gas Parameters for Five Main Boilers.

Boiler	Stack Height (^b) feet	Stack Height, meters ^(c)	Stack Diameter, feet ^(d)	Stack Diameter meters ^(c)	Maximum Load Conditions		Mid Load Conditions	
					As-reported Flow Rate, ACFM (for Blrs. 1,2,3) or SCFMW (for Blrs.4&5) ^(e,f)	Gas Exit Velocity, meter per second ^(e)	As-reported Flow Rate, ACFM (for Blrs. 1,2,3) or SCFMW (for Blrs.4&5) ^(e,f)	Gas Exit Velocity, meter per second ^(e)
1	158.14	48.2	8.5	2.6	450.9	428583	38.1	433.7
2	158.14	48.2	8.5	2.6	427.0	341229	30.3	427.0
3	158.14	48.2	8.0	2.4	410.4	191217	27.8	408.7
4	158.14	48.2	8.0	2.4	423.2	196913	29.5	417.0
5	158.14	48.2	8.0	2.4	414.8	196206	28.9	410.4
								144476
								21.0

Notes:

(c) Uses value reported in "Protocol for Modeling the Effects of Downwash from Mirant's Potomac River Power Plant March, 2005.

(d) Values reported to DEQ in annual reports (DEQ's Consolidated Emissions Report; years 2000 through 2003)

(e) "Mirant Response to City of Alexandria Data Request- Part 2," June 3, 2005.

(f) ACFM = actual cubic feet per minute; SCFMW = standard cubic feet per minute with moisture.

Toxic air pollutant impacts by PRGS are compared against DEQ's significant ambient air concentration guidelines prescribed in 9 VAC5-60-230. These guidelines are based on the Threshold Limit Ceiling (C), Short-term Exposure Limit (STEL) and Time Weighted Average (TWA) exposure criteria developed by the American Conference Governmental and Industrial Hygienists, with scaling factors that are intended to account for chronic versus worker-based exposure scenarios.²⁹

Through its Integrated Risk Information System (IRIS) program, US EPA develops chronic exposure criteria for toxic air pollutants. Impacts were assessed against these IRIS guidelines where these are available; however, to date, IRIS criteria have been developed for only a minor portion of the toxic air pollutants of this analysis.

2.4 Building Downwash Dimensions

Structures that influence the boilers' plume's behavior include the boiler and turbine buildings, bottom and fly ash silos and the Marina Towers residential structure. The US EPA's Building Profile Input Program with Prime, released in December, 2004,³⁰ was applied to determine the height, width, and length of down-washing structures, and distance to adjacent structures, for each of the potential 36 wind directions.³¹ Figure 2-1 shows these structures for which building footprints and heights were input to BPIP-PRIME. For this analysis, the boiler building's layout was assumed to include the housings of all five ESPs.

Table 2-6 lists each of the PRGS sources and the maximum projected height and width affecting the source, as calculated by BPIP-PRIME. Currently BPIP-PRIME and AERMOD do not have the capability to calculate wake effects on area sources, i.e., for this analysis, the coal and ash yard sources exclusive of the silos.

Table 2-6. BPIP-PRIME Downwash Dimension Program's calculations of Maximum Height and Widths affecting each Source, with associated structure indicated.

Source	Maximum Height Affecting Source and Controlling Structure	Maximum Projected Width and Associated Structure
Boiler 1	35.3 m. (Boiler Building)	175 m. (Boiler/Turbine)
Boiler 2	39.6 m. (Marina Towers)	175 m. (Boiler/Turbine)
Boiler 3	39.6 m. (Marina Towers)	175 m. (Boiler/Turbine)
Boiler 4	39.6 m. (Marina Towers)	175 m. (Boiler/Turbine)
Boiler 5	39.6 m. (Marina Towers)	175 m. (Boiler/Turbine)
Fly Ash Silos	35.3 m. (Boiler Building)	175 m. (Boiler/Turbine)
Bottom Ash Silo	35.3 m. (Boiler Building)	197 m. (Boiler/Turbine/Fly Ash Silos)

Other offsite structures were evaluated, specifically the Trans Potomac building to the south, and several residential structures to the southwest, but these do not produce wake effects on emissions from any of the PRGS sources. Appendix A includes a printed listing of the BPIP-PRIME input and output files for this analysis. Review of the maximum

²⁹ Impacts for lead are evaluated against the DEQ significance guideline because it is more restrictive than the NAAQS 3-month standard.

³⁰ <http://www.epa.gov/ttn/scram>.

³¹ "User's Guide to the Building Profile Input Program," US EPA, October, 1993, www.epa.gov/ttn/scram. The BPIP-PRIME program also determines the distance between adjacent structures for each wind orientation. In AERMOD, wind directions are apportioned into ten degree increments.

projected width shown above shows close agreement with the maximum width within the BPIP-PRIME output files.

2.5 Coal and Ash Yard Process Emissions and Modeling Parameters

This analysis includes PM10 and PM2.5 emissions from each of the coal and ash yard process sources. These sources, their process characteristics and emissions are listed in Table 2-7. Figure 2-2 shows these sources on a planview of the facility.³² Emission factors derive from US EPA's estimates for aggregate handling and storage piles, paved roads, and mineral processing³³ and open fugitive dust sources.³⁴ Site-specific characteristics were used whenever possible, including process characteristics derived from DOE coal purchase records,³⁵ data submittals from Mirant to the City of Alexandria,³⁶ meteorological observations³⁷ and inspection reports of the facility by both CH2M Hill³⁸ and the City of Alexandria.³⁹ Additional calculations showing assumptions and inputs for each of the separate sources of the coal and ash yard are shown in Appendix B.

This analysis assumes control technologies and emissions consistent with implementation of each of the emission control projects defined in "Appendix A: Environmental Projects" of the facility's proposed Consent Decree.⁴⁰

2.6 Receptors

Flagpole receptors⁴¹ were placed at Marina Towers and at other raised residential and commercial structures, including those that were identified and requested for analysis by the City of Alexandria. Most of these structures are located within two kilometers of PRGS. Table 2-8 lists these elevated structures, their addresses, the number of levels and their coordinates with respect to the PRGS. For the elevated residential structures, a receptor was placed at each of the levels, assuming vertical spacing between levels of 10 feet (3.05 meters). For Marina Towers, located directly within the zone of downwash influence (depending on wind direction, Marina Tower's wake encompasses PRGS or vice versa), receptors were placed at locations corresponding to each of the tower's six faces on its 13 levels. Only one receptor was located at the coordinates of commercial structures; this receptor was placed at rooftop, representative of the location of air intake vents.

Discrete receptors were also placed along the facility's fence line at approximately 50 meter spacing. Figure 2-2 also shows these discrete fence line receptors.

³² Tiles D10 and D11 of orthophotograph, GIS Data, City of Alexandria, Spring, 2004 on CD-ROM.

³³ US EPA's AP-42, "Compilation of Air Pollutant Emission Factors," Section 13.2.1 Paved Roads and Section 13.2.4 Aggregate Handling and Storage Pile, December, 2003, www.epa.gov/ttn/chief/ap42.

³⁴ "Control of Open Fugitive Dust Sources," Section 4.1.3, EPA-450/3-98-008.

³⁵ Ibid, www.eia.doe.gov.

³⁶ "Mirant Response to City of Alexandria Data Request" and "Mirant Response to City of Alexandria Data Request – Part 2," David. S. Cramer of Mirant to Lalit Sharma of City of Alexandria, April 4, 2005 and June 3, 2005, respectively; both transmittals via email.

³⁷ NCDC SAMSON data for DC National Airport, 1986 to 1990.

³⁸ "Fugitive Dust Review," Jay Quimby of CH2M Hill to Debra Knight, Mirant, July 20, 2001.

³⁹ Draft Memorandum, Malay Jindal, MACTEC FPI to Lalit Sharma, City of Alexandria, February 2, 2005.

⁴⁰ Consent Decree, United States of American and the State of Maryland v. Mirant Potomac River, LLC and Mirant Mid-Atlantic, LLC, September, 2004.

⁴¹ Dispersion algorithms account for the difference between a receptor on a hill (elevated receptor) versus a receptor on a raised structure (flagpole receptor).

The inner receptor grid is defined in cartesian coordinates. Its outer boundaries form a square with sides of 2000 meters, with PRGS at its center. Receptors occur every 100 meters along vertical and horizontal inner grid lines at all locations outside of the facility's property line. An additional receptor grid is defined in polar coordinates, with receptors placed at 1.25, 1.5, 2.0, 3.0, 4.0, 5.0 and 7.5 kilometers distance along every 10 degree radial from the PRGS. Due north is equivalent to 0/360 degrees.

Figure 2-1. Building Outlines and Heights input to Building Profile Input Program (with Prime).

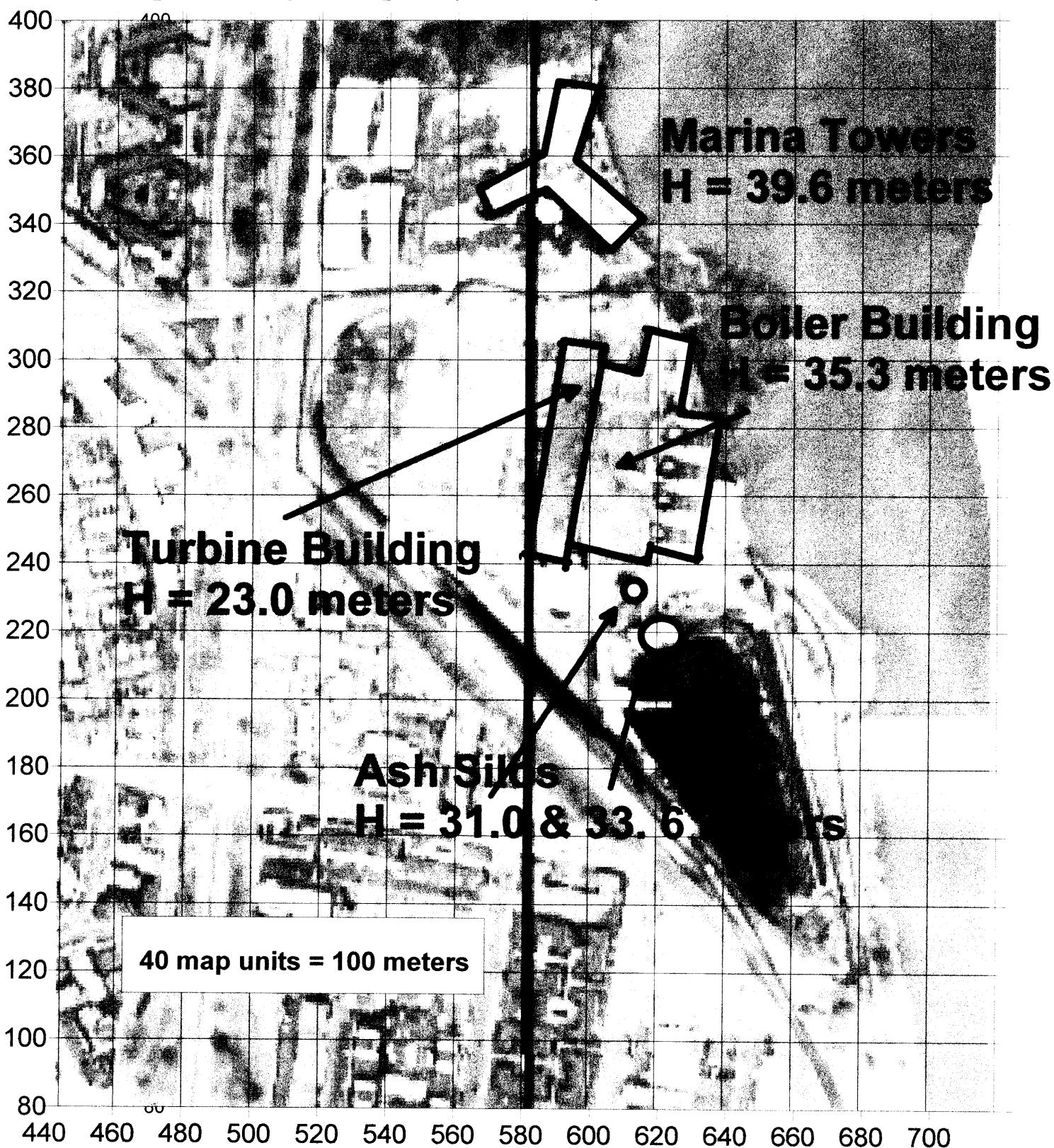


Table 2-7. Coal and Ash Yard $\text{PM}_{2.5}$ and PM_{10} Emission Rates and AERMOD Source Inputs.

NAME	AERMOD Source Type	LOCATION (OR VERTICES, FOR AREA/CIRC SOURCE)		AREACIRC INPUTS	PM_{10} EMISSIONS	PM _{2.5} EMISSIONS	ISHORT-TERM EMIS RATE	ISHORT-TERM EMIS ANNUAL EMIS RATE	ITERM EMIS ANNUAL EMIS RATE	HEIGHT, M ^(d)	VEL., MPS	TEMP, K	DIAM., M	X, INIT, M	Y, INIT, M	ROT ANGLE, DEG.	POINT SOURCE INPUTS	AREA OR VOL INPUTS
		EAS, M	NORM, M															
ABSILOS	AREA/CIRC	Ash emissions from loading trucks at bottom ash silo(20 diam.)	-25	-140	10.4	8.00	1.76E-08	1.04E-08	5.53E-09	3.26E-09 g/(sec*m ²)	3.0							
AFSILOS	AREA/CIRC	Ash emissions from loading trucks at flyash silos	-13	-165	10.4	25.0	1.6E-08	9.46E-09	5.0E-09	2.97E-09 g/(sec*m ²)	3.0							
PBSILOS	POINT	Bottom Ash Silo Ventilation used ENSR's prot or V.D	-25	-140	10.4		4.21E-01	4.21E-01	1.32E-01	1.32E-01 g/sec	31	293	0.1	1.0				
PFSILOS	POINT	Fly Ash Silos Ventilation	-13	-165	10.4		8.42E-01	8.42E-01	2.65E-01	2.65E-01 g/sec	33.6	293	0.1	1.0				
dmn(2)																		
PROAD1	AREA	Emissions from paved roads - Loaded and Unloaded trucks, segment leading away from silos	-100	-165	10.4		4.32E-05	2.54E-05	1.08E-05	6.35E-06 g/(sec*m ²)	0							
PROAD2	AREA	Emissions from Paved Roads - Loaded and Unloaded trucks, segment around tracks	-188	-.90	10.4		4.32E-05	2.54E-05	1.08E-05	6.35E-06 g/(sec*m ²)	0							
PROAD3	AREA	Emissions from Paved Roads - Loaded and Unloaded Trucks, first (in segment parallel to tracks/street)	-200	-103	10.4		4.32E-05	2.54E-05	1.08E-05	6.35E-06 g/(sec*m ²)	0							
PROAD4	AREA	Emissions from Paved Roads - Loaded and Unloaded Trucks, 2nd segment parallel to tracks/street	-125	-190	10.4		4.32E-05	2.54E-05	1.08E-05	6.35E-06 g/(sec*m ²)	0							
PROAD5	AREA	Emissions from Paved Roads - Loaded and Unloaded Trucks, 3rd segment parallel to tracks/street	-50	265	10.4		4.32E-05	2.54E-05	1.08E-05	6.35E-06 g/(sec*m ²)	0							
CDUMP	AREA/CIRC	Coal pile Unloading with Front End Loader	0	-215	10.4		5.01	5.44E-04	2.76E-05	1.71E-04	8.67E-06 g/(sec*m ²)	3.0						
RC_DUMP	VOLUME	Rail Car Dump in Partial Enclosure into Hopper & Hopper Dump onto Belt	0	-303	10.4		1.94E-02	3.13E-03	6.10E-03	9.83E-04 g/sec	1.0							
In above	dmn	Hopper Dump onto Belt to Breaker															250	12.0
COALBR	—	Coal Crushing & Transfer in Partial Enclosure	-43	-215	10.4		8.75E-01	1.41E-01	2.75E-01	4.43E-02 g/sec	10.0						200	15.0
CPILE(a)	AREA/POLY	Coal Breaker in Partial Enclosure Wind Erosion from Coal Pile - Represented by six-sided source - Vertice 1 (to correspond with location)	-13	-178	10.4		4.64E-07	4.64E-07	1.46E-07	1.46E-07 g/(sec*m ²)	3.0							
		Vertice 2 (CW)	38	-170														
		Vertice 3 (CW)	63	-190														
		Vertice 4 (CW)	113	355														
		Vertice 5 (CW)	75	-378														
		Vertice 6 (CW)	-38	-215														
RCAR1	AREA	northernmost rail car area	-250	-40	10.4		7.64E-07	7.63E-07	2.40E-07	2.40E-07 g/(sec*m ²)	3						15.0	150.0
RCAR2	AREA	intermediate several tracks wide	-138	-153	10.4		7.64E-07	7.63E-07	2.40E-07	2.40E-07 g/(sec*m ²)	3						30.0	150.0
RCAR3	AREA	southernmost rail car area	-25	-265	10.4		7.64E-07	7.64E-07	2.40E-07	2.40E-07 g/(sec*m ²)	3						15.0	150.0

Notes:

a) For coal pile, assumes that emission release occurs at 1/2 of max coal pile height based on visual observations, or approximately 3 meters.

b) dmn = did not model. Based on inspection by City(M. Jindal,) truck covers were in place.

c) based on tile D10 from City's orthophotography, or estimated based on nature of activities.

d) height of silos from "Protocol for Modeling the Effects of . . .", March, 2005

Figure 2-2. Coal and ash yard sources and discrete receptors at Marina Tower and along fence line.

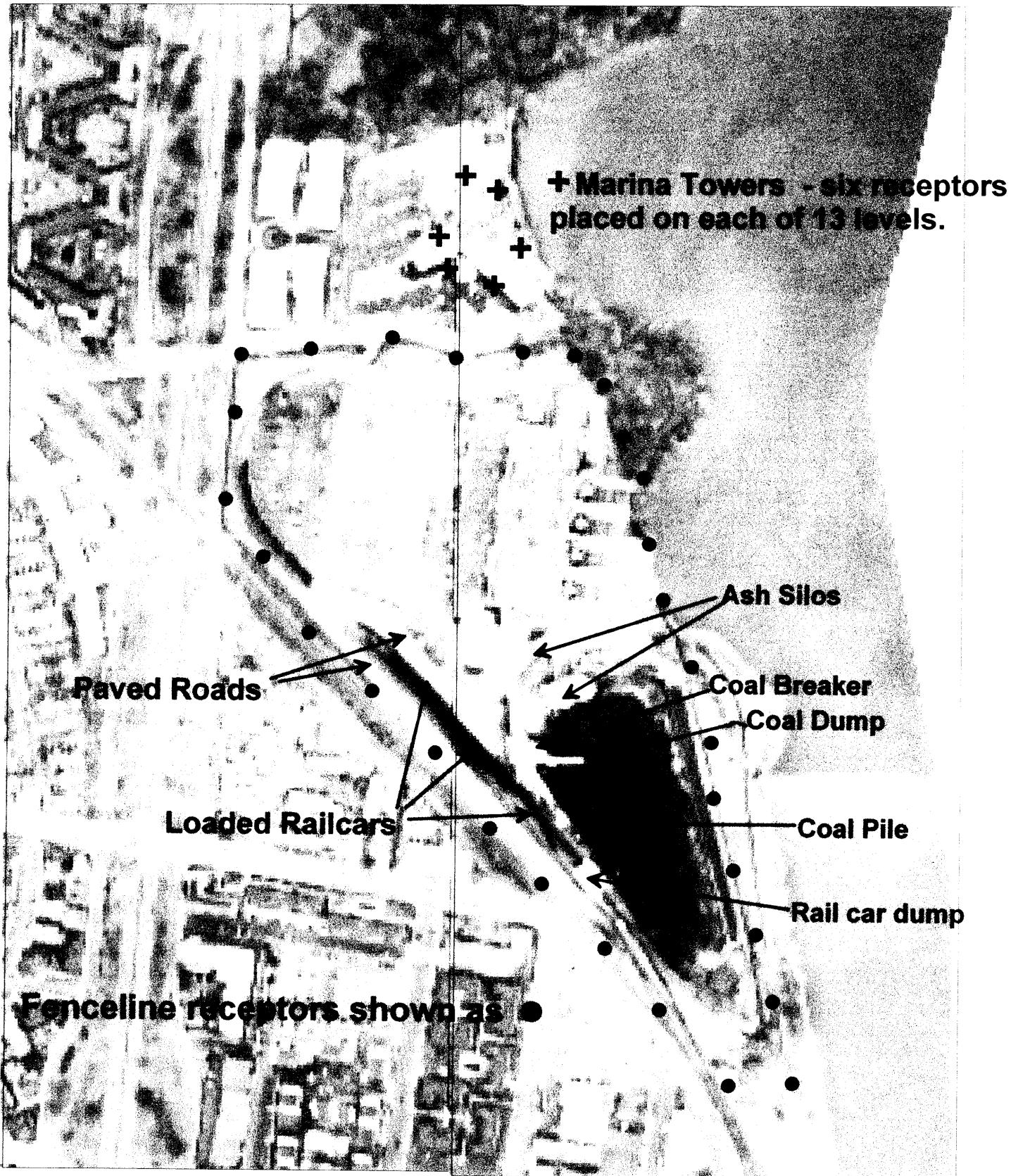


Table 2-8. Multi-level Residential and Commercial Structures where Flagpole Receptors were Placed.

	Address	Levels	X (meters)	Y (meters)
Marina Towers	Slater's Lane	13	50	120
Potomac Shores	402 W. Bashford	3	-80	-280
Trans Potomac	1199 N. Fairfax	10	20	-480
Dangerfield Island	N. of Slater's Lane	2	20	520
Harbor Terrace	501 Bashford	3	-280	-280
Potowmack Crossing	1600 W. Abingdon Dr.	3	-380	120
Mason Hall Apts.	1420 W. Abingdon Dr.	4	-480	-280
Radisson Hotel	901 N. Fairfax	10	-80	-680
Port Royal Condo.	801 N. Pitt	17	-280	-780
Arbello Apts.	833 Bashford Lane	3	-680	-180
Sheraton Hotel	801 N. St. Asaph	10	-380	-780
Alexandria House	498 Madison St.	242	-380	-880
Old Town Crescent	828 Slater's Lane	16	-680	120
Meridian Building	1200 First St.	3	-880	-480
Potomac Club	1201 Braddock Pl.	6	-980	-580
Torpedo Factory	102 N. Union St.	20	120	-1780
Carlyle House	2121 Jamison Av.	3	-380	-1680
Gunston Hall	815 S. Washington	8	-780	-2680
Hunting Point	1202 S. Wash. Pkwy	14	-980	-3080
Portals of Alexandria	601 Four Mile Road	14	-2180	2720
Calvert Apts.	3110 Mt. Vernon Ave.	15	-2680	1520
Carydale East	22 W. Taylor Run	18	-4180	-1480

Discrete receptors were also defined at locations in the City of Alexandria where residents are likely to be young, elderly or health-compromised. These locations include health care, convalescent and daycare facilities, senior centers, schools, and recreational areas. A portion of these receptors were selected by the City of Alexandria,⁴² while the remainder were compiled by reviewing on-line listings of the City's services.⁴³ Impacts for these particular receptors, called sensitive receptors, were determined for each criteria pollutant and TAP using the year of meteorological data for which the respective pollutant's impacts were highest for the full five-year period.

The AERMAP⁴⁴ processor was used to determine geographic elevations for all receptors using United States Geological Services (USGS) digital elevation models for the City of Alexandria and the surrounding area. The five surrounding quadrangles⁴⁵ are labeled 'Anacostia, DC,' 'Annandale, VA,' 'Falls Church, VA,' 'Washington DC East,' and 'Washington DC West.'

⁴² "Additional Air Modeling Receptor Locations Grid Plan to 3 KM," L. Sharma to M. Barrett, December, 13, 2004.

⁴³ "Resource Guide for Alexandria's Children, Youth and Families," City of Alexandria, 2004, www.alexandriava.gov.

⁴⁴ "Revised Draft for the User's Guide for the AERMOD Terrain Preprocessor (AERMAP)," US EPA, April 24, 2004.

⁴⁵ Digital elevation model data are available in 7.5 minute quadrangles; AERMAP reads these data to determine elevation and hill height scales for AERMOD processing. Digital elevation models were relayed to AERO on November 3, 2004 by Steve Reiter of USGS via file transfer protocol.

2.7 Major Source Contributions

Upon request, Maryland Department of the Environment,⁴⁶ District of Columbia Department of Health,⁴⁷ and Virginia Department of Environmental Quality⁴⁸ relayed listings of the major sources of SO₂ and NO₂ within a 20-kilometer radius of PRGS. Based on the approximate significant impact area of PRGS, the analysis initially evaluated only those major sources that are located within 10 kilometers of PRGS. Final AERMOD simulations further limited interacting sources to only those with a significant impact on receptors within the inner receptor grid, where predicted impacts by PRGS are highest.

Results show that the remaining interacting sources, which consist only of SO₂ sources, contribute a very minor portion of total pollutant impacts at these close-in receptors (less than one percent). Therefore, the final results of this analysis exclude their impacts. However, for any future analysis that has as its objective the calculation of a compliance stack height for PRGS, where maximum impacts by the PRGS are expected to extend to a greater distance, interacting sources should be re-evaluated for inclusion in the AAQS analysis.

Table 2-9 lists the interacting sources that were evaluated for potential inclusion in this AAQS analysis and their stack emissions and parameters.

2.8 Minor and Area Source Contributions (Background Air Quality)

Background ambient air concentrations are attributable to the many minor and area sources of pollutants in a given area.⁴⁹ The existing background ambient concentrations of this analysis derive from DEQ monitoring results for years 2001, 2002 and 2003⁵⁰. For short-term averaging periods, the analysis uses the highest-monitored concentration from the nearest monitor within the three-year period. For annual averaging periods, the analysis uses the average of annual observations over the three-year period. Table 2-10 shows the resulting selected background concentrations for each of the criteria pollutants.

Ambient background concentrations are currently monitored by state and federal networks for only a small number of toxic air pollutants; in Virginia, the majority of those that are monitored are polycyclic aromatic hydrocarbons for the purposes of ozone regional scale modeling and do not include the TAPs of this analysis. However, using regional scale dispersion modeling under the National Air Toxics Assessment program, US EPA has estimated the annual background levels of 34 TAPs for each US county; three of the five TAPs that are the focus of this analysis are included. For Arlington County, the estimated concentration for these pollutants, i.e., arsenic, cadmium and mercury compounds, equals 0.00026, 0.00021 and 0.0028 micrograms per cubic meter, respectively.⁵¹ These values are added to the calculated annual impacts for each of these pollutants and the result assessed against the respective significance guidelines. Short-term ambient background levels and ambient background levels for HCl and HF are not available.

⁴⁶ Barry Buckley, MDE, May 9, 2005 via email transmittal.

⁴⁷ Abraham Hagos, District of Columbia, DOH, May 20, 2005, via email transmittal.

⁴⁸ Ken McBee, DEQ, March 30, 2005 via email transmittal.

⁴⁹ "Appendix W to Part 51 – Guideline on Air Quality Models," 40 CFR Ch. 1 (7-1-03 Edition).

⁵⁰ "Virginia Ambient Air Monitoring 2003 Data Report," Department of Environmental Quality (parallel report for years 2002 and 2001), from www.state.deq.gov/airmon/publications.html.

⁵¹ Results are for year 1996, the only year for US EPA conducted the study. The value used here equals the estimated value for the 95th percentile, i.e., the value to which 95% of the county's residents are exposed. From http://www.epa.gov/ttn/atw/nata/pdf/va_conc.pdf.

Table 2-9. Other Major Sources of Criteria Pollutants Within Ten Kilometers^(b)

FACILITY NAME	Signif. impact in grid?	Stk ^(a) in inner grid?	Signif. impact in grid?	Stk Elev.	Dist. KM	Stack Height KM	Stack Diam. M	Stack Ident. MPS	BLR ID	POTENTIAL TO EMIT ^(d)			ACTUAL EMISSIONS										
										SO ₂ TPY	NO _x TPY	PM ₁₀ TPY	SO ₂ GPS	NO _x GPS	PM ₁₀ GPS								
MARYLAND SOURCES:																							
(No major sources within 10 kilometers of PRGS).																							
VIRGINIA SOURCES:																							
COVANTA	NO	25.0	-7.85	-2.19	17	1.2	330 COMB	40.8	0	206.5	9.0	831.0	12.0	0	548.0								
CRYSTAL SQUARE	NO	50.0	0.05	3.91	50	0.6	429 COMB	0.0	0	142.4	1.1	minor 0	2.0	0	minor 0								
DC SOURCES:		0.00	0.00	0.00	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0								
BOLLING AFB CENT. HT.	YES	5.2	2.15	2.11	15	1.8	450 1.2.3	2.0	1.2.3	361	10.4	99	--	--	--								
CAPITOL HILL HOSPITAL	NO	NO	27.4	4.45	7.61	52	0.9	450 1.1.1	5.2	1.2.3	240	6.9	66	0.0	0.0								
DC ARMORY	YES	NO	11.7	5.95	7.11	24	0.9	450.0	3.9	1.2	122	3.5	34	0.0	0.0								
GWU (GELMAN, MARVIN A)	NO	NO	15.7	-0.85	8.51	29	1.5	450 1.2.3	0.8	0	494	14.2	0.0	0.0	0.0								
GWU (ROSS HALL)	YES	YES	15.7	-0.85	8.11	39	1.0	450 1.2	11.9	470	13.5	0.0	0.0	0.0	0.0								
L'ENFANT PLAZA N, E	NO	9.7	1.45	6.81	18	0.9	450 EA.NO	5.5	0	222	6.4	0.0	0.0	0.0	0.0								
MARINE BARRACKS	YES	NO	17.7	4.15	6.11	23	0.8	450.1	1	5.8	0	124	3.6	0.0	0.0								
PEPCO BENNING 1	YES	YES	8.3	7.35	7.91	73	4.6	616 15.16	28.0	0	26856	772.5	0	956.0	217.0								
PEPCO BENNING 2	YES	NO	8.3	7.35	7.91	69	0.6	450 SOUTH	191.6	0	1985	57.1	--	--	--								
PEPCO BUZZARD POINT	YES	YES	3.2	2.55	4.61	12	8.0	772 EA.WE	3.9	0.00	19966	574.3	0.00	25.00	103.00								
US POSTAL SERVICE	YES	NO	7.6	1.85	6.31	23	0.9	450 1.2	7.5	0	232	6.7	0	0	0								
WATERGATE CENTRAL	YES	NO	15.7	-0.85	8.51	54	1.6	450.1	3.0	0	580	16.7	0	0	0								
NAVY YARD BLDG 116	YES	NO	1.8	3.65	5.72	67	3.7	450 NW.NE	2.4	0	1806	51.9	0	0	0								
U.S. CAPITOL POWER	YES	NO	9.0	3.05	6.51	51	3.7	494 EA.WE	3.0	0	4539	130.6	0	0	0								
WASHINGTON POST	YES	NO	24.8	0.75	9.11	37	0.5	450.1	36.3	0	419	12.1	0	0	0								
GSA WEST HEATING	YES	NO APP 1	-1.25	6.81	41	2.4	484 1.2.3.5	11.8	0	6339	182.3	--	--	--	--								
D.C. GENERAL HOSP.	YES	NO	10.7	5.95	6.61	3	0.0	255 MAIN ^b	0.0	0	964	27.7	--	--	--								
SAINTEL HOSPITAL	YES	NO	50.8	3.65	3.11	1	0.0	255 EA.WE	0.0	0.00	2370	68.2	0.00	0.00	--								

Notes:

a) Base elevations found by running AERMAP for given UTM coordinates.

b) DEQ sources provided in response to request for all NO_x, SO₂, PM₁₀ major sources within 20 kilometers of PRGS. This list was further limited to sources within 10 kilometers of PRGS. Major sources were defined by attainment definitions or 100 tons per year.

c) GPS = grams per second.

Table 2-10. Criteria Pollutant Ambient Background Concentrations (micrograms per cubic meter).^e

		CO^(a,b)	NO₂^(d)	PM_{2.5}^(a)	PM₁₀^(a)	SO₂^(a,d)
		517 N. St. Asaph St., Alexandria	Aurora Hills Visitor Center, Arlington Co.	6120 Brandon Ave., Springfield	517 N. St. Asaph St., Alexandria	
	1-hour	8-hour	annual	24-hour	annual	24-hour
2001	4,924	2,748	43	37	15	42
2002	4,580	2,748	47	39	15	41
2003	4,008	3,206	43	40	14	38
Selected Value ^(b,c)	4,924	3,206	45	39	15	42

Notes:

- a) Short-term values shown are 2nd maximum values..
- b) For CO, NOx, PM10 and SO₂, selected concentration is the greatest among the monitor's values for the three years.
- c) For PM2.5, selected concentration is the average of the monitor's values for the three years.
- d) CO, NO₂ and SO₂ converted assuming 1 ppm of CO equals 1,145 micrograms per cubic meter; 1 ppm of NO₂ equals 1,881 micrograms per cubic meter; and 1 ppm of SO₂ = 2,619 micrograms per cubic meter.
- e) Source for concentrations: "Virginia Ambient Air Monitoring 2003 Data Report," Department of Environmental Quality, www.state.deq.gov/airmon/publications.html (and parallel reports for years 2002 and 2001 also).

2.9 Meteorological Input Data

Surface observations derive from the National Weather Service's meteorological records for Ronald Reagan Airport for the years 2000 through 2004. Corresponding upper air measurements derive from the National Weather Service's observations from Sterling, Virginia, the closest location for which upper air data are available. Both sets of data were obtained through the National Climatic Data Center in Asheville, North Carolina.⁵² The AERMET preprocessor (Version 02222)⁵³ was used to process and merge these data prior to application of AERMOD.

For input to the preprocessor AERMET, surface characteristics for the three-kilometer area around the PRGS were determined using terrain and surface features shown on the USGS's Alexandria quadrangle.⁵⁴ Figure 2-3 shows how the sectors were divided; sectors were selected to group areas with maximally common characteristics. Table 2-11 below shows the resulting land use apportionment per sectors, and Table 2-12 shows the resulting sector values for albedo, surface roughness and Bowen ratio. Selection of sectors and assignment of surface characteristics conforms to guidance procedures stipulated for the AERMET preprocessor. Inspection of Figure 2-3 and Table 2-10 shows that the area within the three-kilometer radius circle around PRGS encompasses land uses that are mixed, including water, grassland, deciduous forest and urban settings.⁵⁵

Table 2-11. Land Use Types

Sector	Degrees	Water	Deciduous Forest	Cultivated Land	Grassland	Urban
1	337 - 18	0.35	0.0	0.15	0.45	0.05
2	18 - 48	0.8	0.0	0.0	0.0	0.2
3	48 - 120	0.2	0.1	0.1	0.1	0.5
4	120 - 180	0.6	0.2	0.0	0.2	0.0
5	180 - 337	0.0	0.2	0.05	0.05	0.7

⁵² Five years of observations from each of the Ronald Reagan Airport and Sterling, Virginia stations were transferred to AERO Engineering Services by Sharon Capps-Hill of the National Climatic Data Center on March 14, 2005 through file transfer protocol.

⁵³ "Revised Draft for the User's Guide for the AERMOD Meteorological Preprocessor (AERMET)," November, 1998. An updated version of AERMET (Version 04300) was released in mid-June of 2005. However, due to the very recent date of that version's release, this analysis uses data processed according to version 02222. Personal correspondence with Warren Peters of US EPA indicates that AERMET Version 04300 produces meteorological data that for this analysis's purposes that are equivalent to data from Version 02222. As suggested by Mr. Peters, the headers of the AERMET meteorological data file of this analysis were modified to allow them to be read by AERMOD 04300.

⁵⁴ "Alexandria Quadrangle," Virginia-District of Columbia-Maryland, 7.5 Minute Series (Topographic-Bathymetric), United States Geological Survey, 1994.

⁵⁵ Although the area immediately surrounding the facility to the west and south is dominated by urban land uses, urban land uses do not form a majority of the three kilometer area.

Figure 2-3. Sector Definition in Degrees for Surface Characteristics in AERMET.

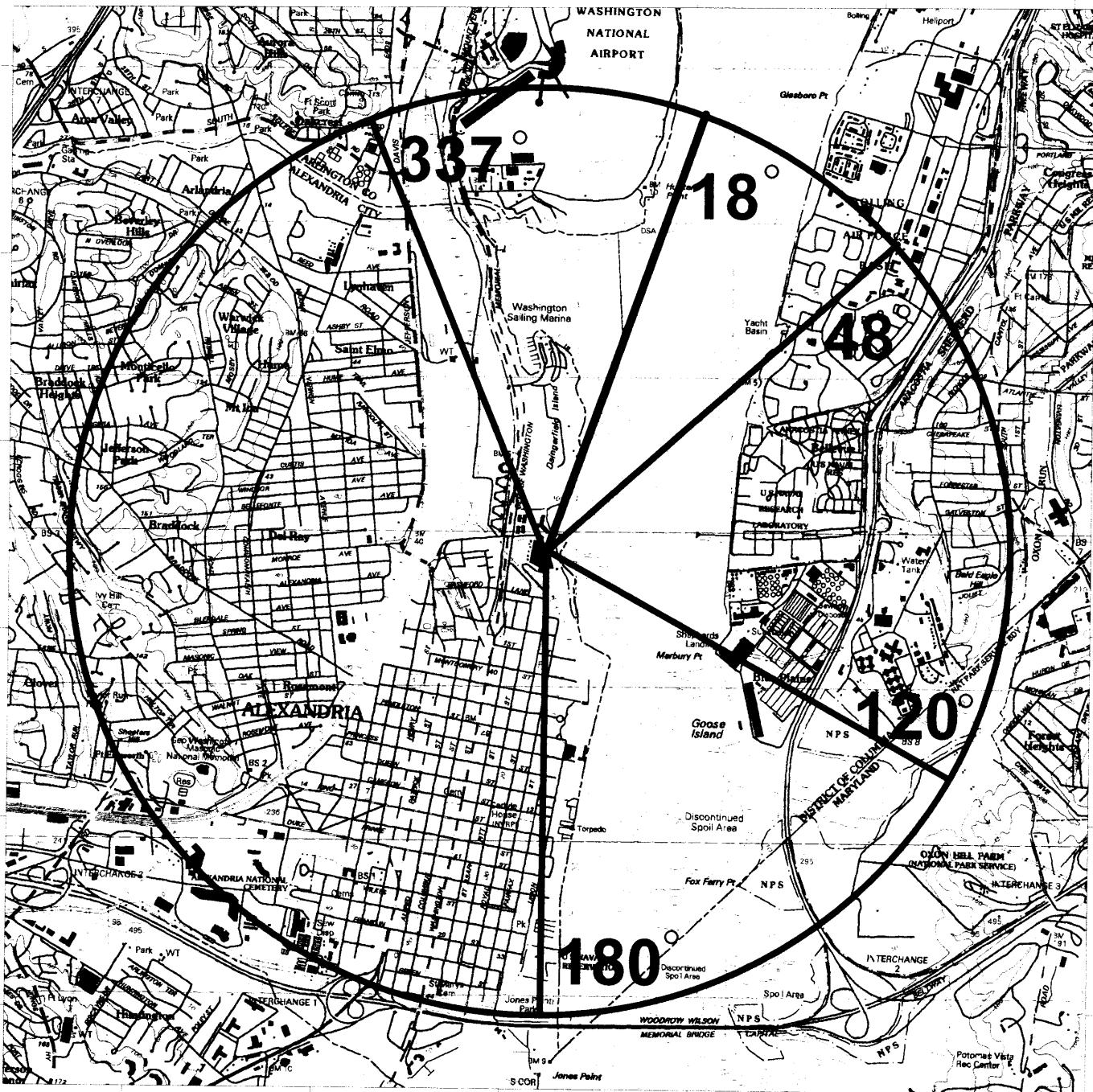


Table 2-12. Surface Characteristics of Sectors Defined within AERMET for Three Kilometer Radius Around PRGS.

Sector	Degrees	Albedo			Bowen Ratio			Roughness					
		Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall	Winter	Spring	Summer	Fall
1	337-18	0.31	0.15	0.15	0.18	0.82	0.31	0.57	0.69	0.06	0.08	0.13	0.06
2	18 - 48	0.19	0.12	0.11	0.15	0.36	0.28	0.48	0.48	0.20	0.20	0.20	0.20
3	48 - 120	0.27	0.14	0.15	0.17	1.11	0.66	1.18	1.29	0.57	0.61	0.66	0.59
4	120 - 180	0.24	0.13	0.12	0.15	0.26	0.28	0.28	0.46	0.13	0.21	0.28	0.16
5	180-337	0.28	0.14	0.16	0.17	1.34	0.88	1.53	1.69	0.83	0.90	0.98	0.86

Notes:

- a) See Tables 4-1(a), 4-1(b), 4-2 and 4-3 within "Revised Draft...Preprocessor (AERMET)," November, 1998 for each season's value.
- b) As recommended by AERMAP guidance, values for each land type for winter equal mid-point of fall/winter values to account for milder winter conditions (see Chapter 4 of AERMAP manual, Table 4-1, 4-2-b, and 4-3).
- c) Winter, spring, summer and fall are labeled as 1, 2, 3, and 4 in AERMET, respectively.

3. Results and Conclusions

3.1 Maximum Impacts of Criteria Pollutants

Results of maximum short-term and annual impacts for CO, NO₂, PM₁₀, PM_{2.5} and SO₂ for each year are shown in Table 3-1. Maximum impacts were added to the respective pollutant's background level to determine the maximum concentration. Table 3-1 also shows the receptor at which the maximum impact occurs. These results show that maximum impacts exceed the respective AAQS for all pollutants except CO.

Table 3-2 below summarizes these impacts, showing the relationship between maximum impacts and the AAQS for each of the pollutants that exceed standards. For these pollutants, maximum impacts exceed the standard by three to eighteen times. These impacts do not reflect the highest heat input rating of the boilers that have only recently been reported;⁵⁶ impacts of this analysis would almost directly proportionally increase to reflect the higher heat input rates. For boilers 1, 4 and 5, the highest reported heat input rates are 2.0%, 6.3% and 8.2% higher, respectively, than the rates of this analysis. Heat input rates for boilers 2 and 3 within this analysis are slightly greater, by 0.4% and 0.5%, respectively, than the most recent reported values. Due to the variation in the heat input rate gaps among the boilers, and the variation in contribution among boilers to total impact at a given receptor and time period, it is not possible to scale these impacts to assess the maximum impacts that the generally higher rates would produce. However, considering that the northern-most boilers, i.e., boilers No. 4 and 5, show the greatest increase in heat input rates, and considering that maximum impacts for all criteria pollutants except PM₁₀ occur along the fenceline or at Marina Towers immediately adjacent to these boiler stacks' (as discussed below), an increase in maximum short-term impacts over the results shown in Tables 3-2 and 3-3 for SO₂ and PM_{2.5} of at least 3% to 5% is expected.

The large margin between compliance and impacts that these results show indicates a high frequency of occurrence of concentrations in excess of the standards as well as a broad geographic area of noncompliance, as discussed below. Note that at these fenceline and offsite locations, short-term impacts of SO₂ exceed worker-based protection thresholds;⁵⁷ closer inspection of impacts within plant boundaries may show even greater violations of Occupational Safety and Health Administration standards.

Table 3-2. Maximum Impacts ($\mu\text{g}/\text{cu.m.}$) as a Multiple of AAQS for Pollutants that Exceed the Standard.

NO₂		PM_{2.5}		PM₁₀		SO₂		
Ann.	24-hr	Ann.	24-hr	Ann.	3-hr	24-hr	Ann.	
416.	544.	93.	766.	171.	10,601.	6,869.	1,009.	
AAQS								
100.	65.	15.	150.	50.	1,300.	365.	80.	
Ratio of Impact to Standard								
4.2	8.4	6.2	5.1	3.4	8.2	18.8	12.6	

⁵⁶ "Mirant Potomac River LLC, Alexandria, VA, A Dispersion Modeling Analysis of Downwash from Mirant's Potomac River Power Plant," ENSR Corporation, August, 2005.

⁵⁷ For SO₂, the American Conference of Governmental and Industrial Hygienists' 8-hour threshold limit value equals 5,238 micrograms per cubic meter. See "2005 TLVs and BEIs," ACGIH Worldwide, Signature Publications, 2005.

Table 3-1. Maximum Impacts including Background vs. Ambient Air Quality Standards (micrograms per cubic meter).

	CO^(a)	NO₂	PM_{2.5}^(b)	PM₁₀^(b)	SO₂^(a)				
	1-hour	8-hour	24-hour	annual	24-hour	annual	3-hour	24-hour	annual
2000	6,603	4,892	332	523	76	661	148	9,548	6,809
2001	7,072	5,442	347	494	78	724	148	10,284	6,544
2002	6,753	4,962	371	527	84	702	141	10,363	6,621
2001	6,488	4,339	314	467	71	663	152	8,715	6,067
2004	6,450	4,341	362	513	82	648	144	9,366	6,583
Background Value	4,924	3,206	45	39	15	42	19	238	60
Location of Maximum, meters	(- 63, 130)	(- 63, 130)	(25, 10)	(13, 60)	(25, 10)	(-163, -165)	(-88, -240)	(-63, 130)	(13, 60)
Height of Receptor	7.9 m (25 ft)	7.9 m (25 ft)	0.0	0.0	0.0	0.0	0.0	7.9 m (25 ft)	0.0
Description of Receptor	Marina Towers, 3rd Lvl.	Marina Towers, 3rd Lvl.	Northeast Fence Line	Northeast Fence Line	Southwest Fence Line	Southwest Fence Line	Marina Towers, 3rd Lvl.	Northeast Fence Line	Northeast Fence Line
Total Maximum Impact^(3,4)	11,996	8,648	416	544	93	766	166	10,601	6,869
National and DEQ Ambient Air Quality Standards	40,000	10,000	100	65	15	150	50	1,300	365
									80

Notes:

- a) For SO₂ and CO, maximum short-term values equal the highest second highest value among all receptors.
- b) To allow year-by-year processing rather than multiyear processing, this analysis presents the highest fourth-highest among all receptors for each year for PM_{2.5} and PM₁₀.
- c) Total maximum impacts for CO, NO₂, PM₁₀ and SO₂ equals highest among years' values added to background.
- d) Total maximum impacts for PM_{2.5} equals the average of the maximum values among years added to background.

For CO, NO₂, PM_{2.5} and SO₂, maximum impacts occur either at Marina Towers, specifically at the closest receptor to PRGS, at the third level, or at ground-level receptors on the PRGS's northeast fenceline, just to the north of Boiler no. 4's ESP housing. This is expected for these pollutants for which emissions from the five main boilers, versus the coal and ash yard sources, dominate results. These receptors are located a relatively short distance from the facility's fence line, and at this location to the north/northeast of the facility, plumes from all five of the boilers combine and impact this area for winds from the south/southwest. This area also falls into the cavity region of the Marina Towers and PRGS, further increasing impacts.

Emissions from the coal and ash yard sources appear to dominate maximum impacts for PM₁₀; maximum impacts for this pollutant occur along the facility's southwestern fence line. This is a different result than for PM_{2.5}, i.e., the location of maximum impacts for these pollutants is different because while PM₁₀ and PM_{2.5} emissions from the main boilers are equal, PM_{2.5} emissions from the coal and yard sources occur at significantly lesser rates than PM₁₀. Therefore, for PM₁₀, impacts by the ground-level, non-buoyant coal and ash yard sources contribute to even greater impacts than those from the boilers.

Although the greatest of the calculated concentrations occur at the locations discussed above, areas where receptors show exceedances of the standards extend to distances well beyond the fenceline to the south/southwest of the PRGS and to the north of Marina Towers. For all pollutants, impacts are greatest at Marina Towers and beyond to the north, and in residential areas to the southwest of the PRGS fence line, including south of Bashford Lane and extending to points further south than Montgomery Street. Plots of impacts for the five criteria pollutants in excess of standards show this (F. 3-1 through 3-8). For NO₂ (F. 3-1), these plots show that impacts exceed standards to 700 meters to the north of Marina Towers, and approximately to 200 meters from the southwest fence line. For PM_{2.5} (F. 3-2 and 3-3), impacts exceed standards by two or more times to a distance of 800 meters. For PM₁₀, short-term impacts do not fall below the standard within 400 meters (F. 3-4).

Impacts of SO₂ (F. 3-6, 3-7, and 3-8) display an even broader extent of noncompliance; short-term impacts exceed the AAQS by three to five times to distances beyond 600 meters from the PRGS fence line, and impacts do not fall below the AAQS within one kilometer from the facility except for very limited areas. Application of the MAXFILE output option for which all occurrences of SO₂ 24-hour impacts over the AAQS were written to an output file, shows that for the worst-case year (2002) and for the entire area of noncompliance (stretching beyond one kilometer in several directions), that on average, impacts from the PRGS (exclusive of background) exceed the AAQS one of every six to seven days. Also, the average exceedance for that day equals three times the AAQS. Note that for many specific areas within this noncompliance area, the frequency and severity of exceedances will be higher. For SO₂, annual impacts also exceed the AAQS at distances beyond one kilometer. Sample output from application of the MAXFILE option, sorted by receptor, is shown in Appendix C (a full listing is not possible due to the large total occurrences of exceedances for 2002, i.e., totaling 33,585 records).

For elevated receptors, Table 3-3 shows maximum impacts. Elevated structures are listed according to approximate distance from the PRGS, with distance increasing from top to bottom. Exceedances of standards are shown in bold. For all elevated receptors, CO impacts fall below standards.

Table 3-3 shows that impacts at elevated receptors for NO₂ exceed the AAQS at only Marina Towers and Dangerfield Island. For PM₁₀, impacts exceed the 24-hour AAQS for structures located within approximately five hundred meters of the PRGS (Marina Towers, Potomac Shores, Trans Potomac, Dangerfield Island, Harbor Terrace and Mason Hall), while for PM₁₀ annual impacts, only Marina Towers and Potomac Shores receptors show exceedances. For PM_{2.5}, impacts at almost all structures exceed the AAQS, i.e., only for Gunston Hall, Hunting Point, Portals of Alexandria, Calvert Apartments, and Carydale East do impacts fall below or equal the AAQS. For SO₂, almost all elevated structures show exceedances for short-term impacts; while annual impacts are exceeded at only Marina Towers, Potomac Shores, Trans Potomac, Dangerfield Island, Harbor Terrace, Mason Hall and Radisson Hotel.

For these elevated receptors, maximum impacts depend both on distance from the PRGS and overall structure height; for some structures at greater distance than others, impacts are greater if total levels are higher (for example, Mason Hall and Radisson Hotel versus Harbor Terrace). However, Table 3-3 shows that impacts are more dependent on distance from the facility than on levels (exceedances generally drop off as the distance from the PRGS increases, regardless of total levels).

Figure 3-1. Maximum Annual NO₂ impacts (micrograms per cubic meter) including background shown as multiples of the standard. In shaded areas impacts exceed the standard by one or more times.

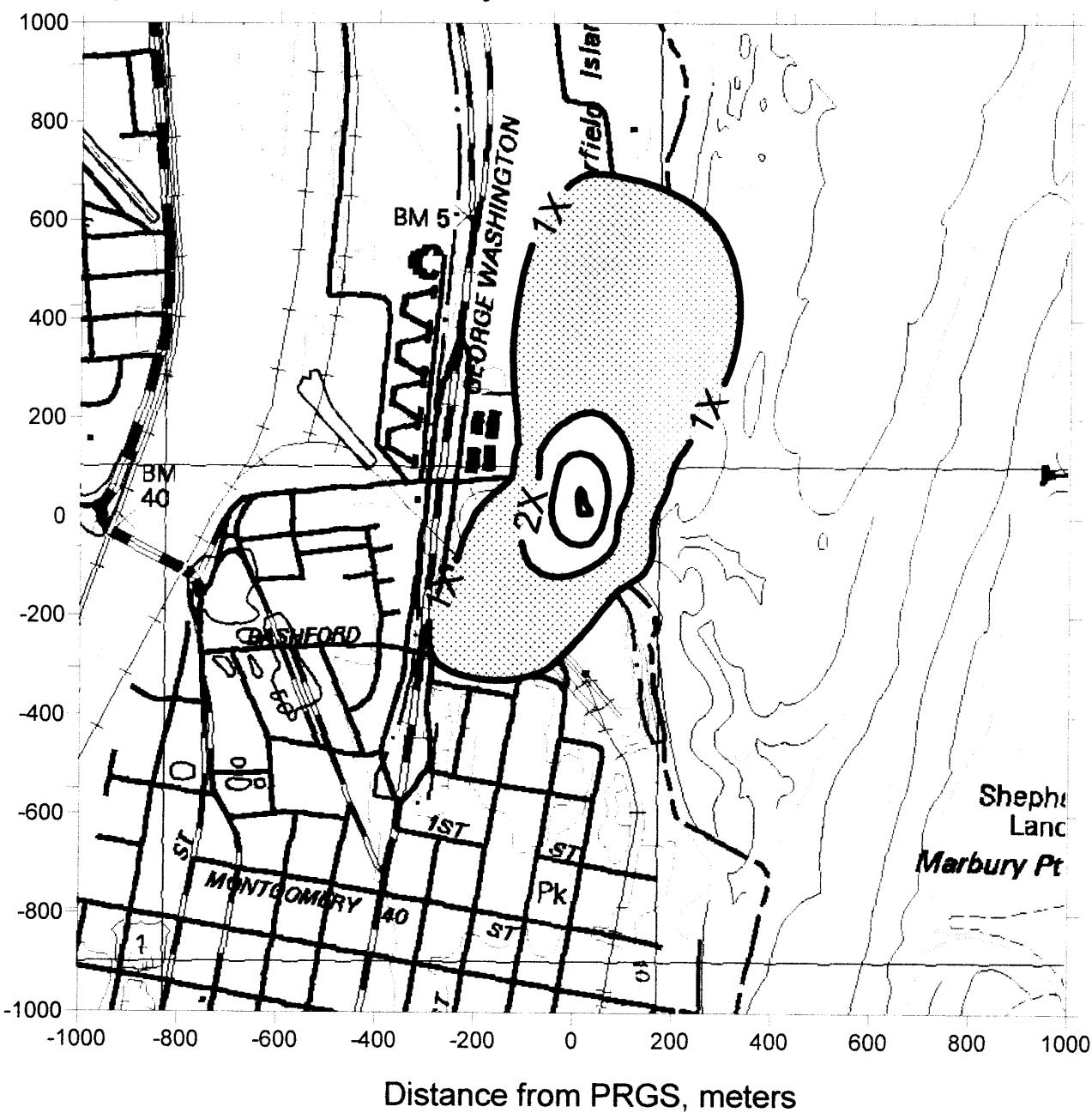


Figure 3-2. Maximum 24-hour PM2.5 impacts (micrograms per cubic meter) including background shown as multiples of the standard. Impacts in shaded areas exceed the standard by two or more times -- the full area of noncompliance exceeds this grid's boundaries.

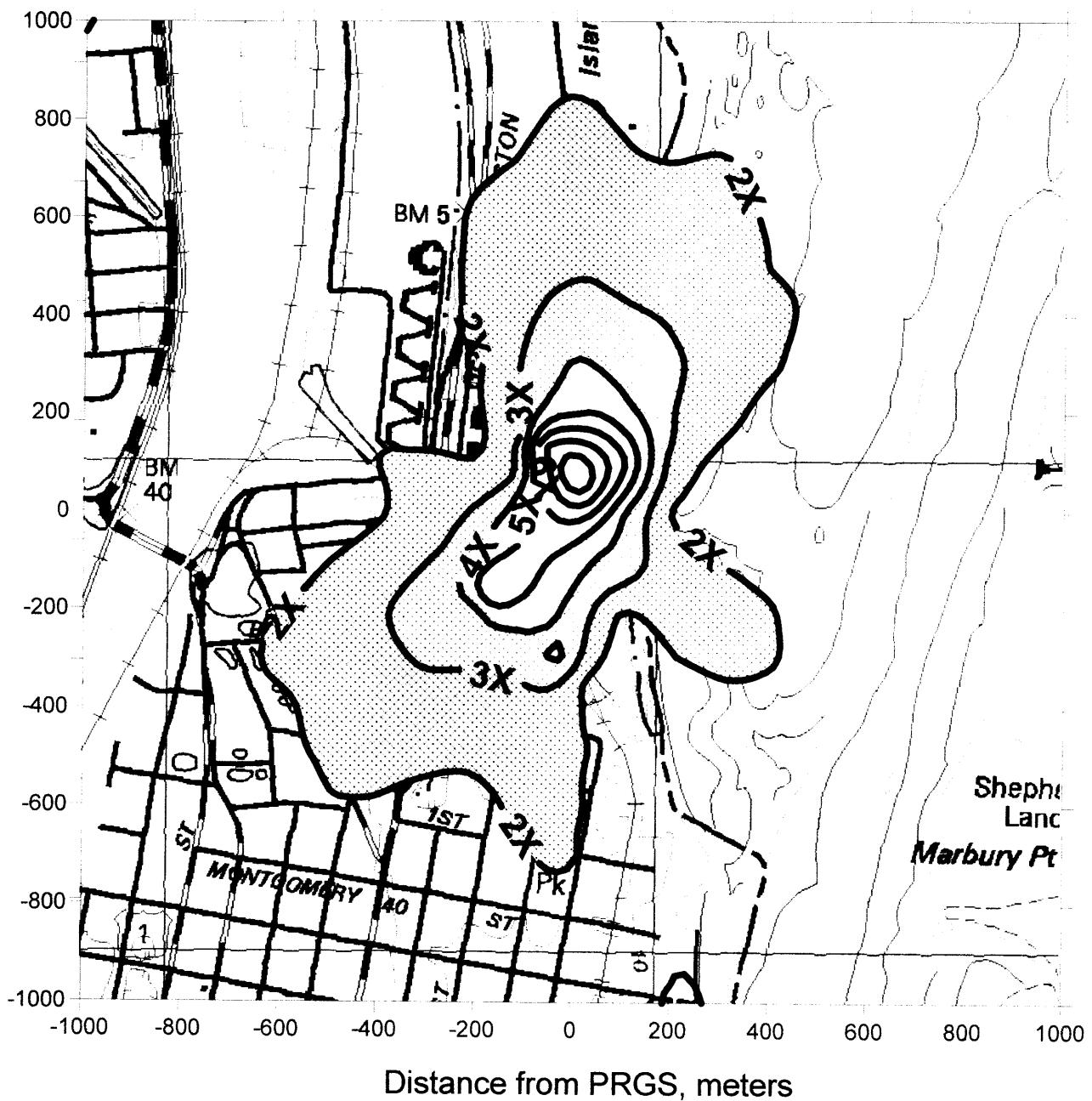


Figure 3-3. Maximum annual PM2.5 impacts (micrograms per cubic meter) including background shown as multiples of the standard. Impacts in shaded areas exceed the standard by two or more times. The full area of noncompliance exceeds this grid's boundaries.

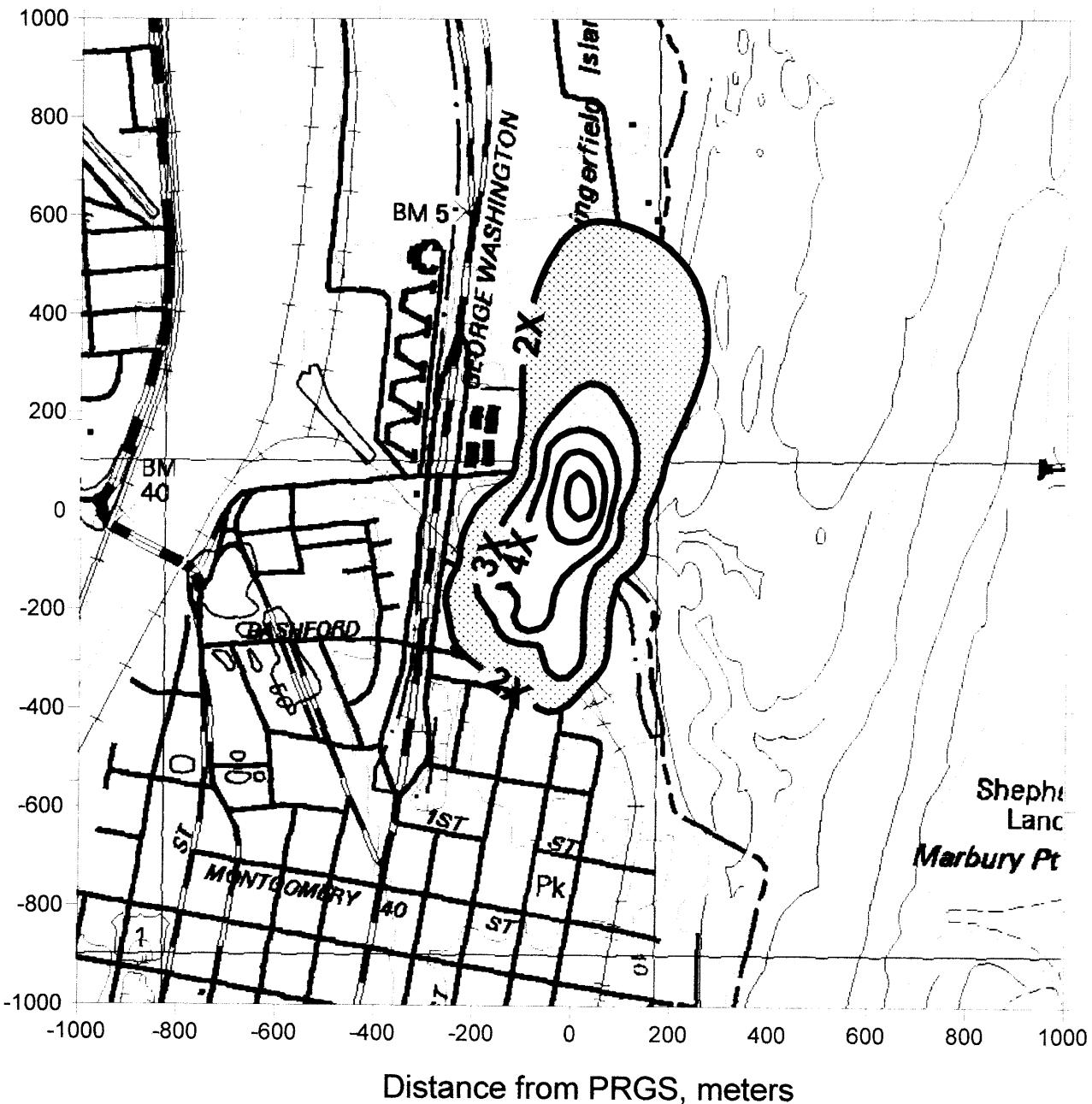


Figure 3-4. Maximum 24-hour PM10 impacts (micrograms per cubic meter) including background shown as multiples of the standard. Impacts in shaded areas exceed the standard.

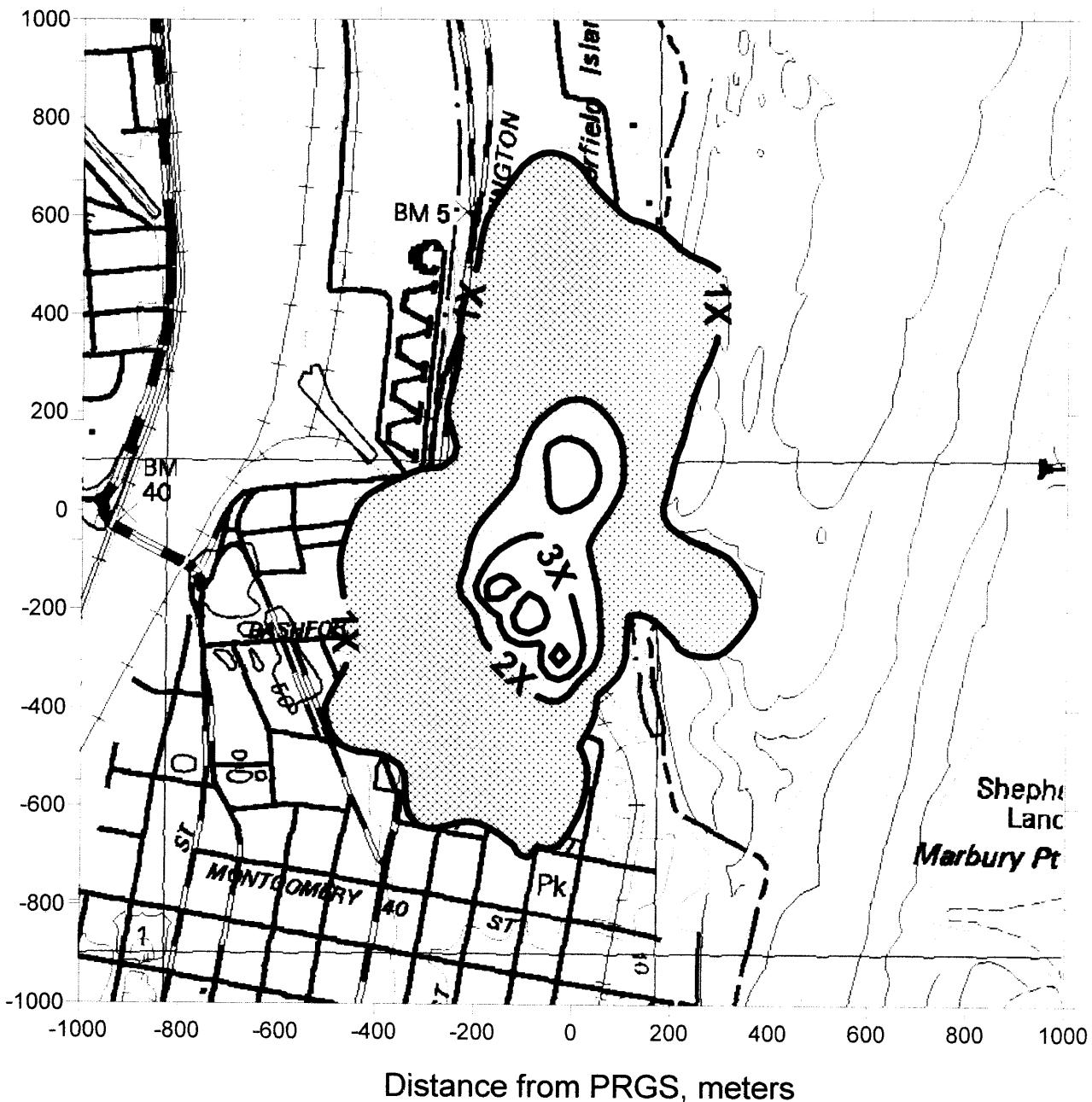


Figure 3-5. Maximum annual PM10 impacts (micrograms per cubic meter) including background shown as multiples of the standard. Impact in shaded areas exceed the standard.

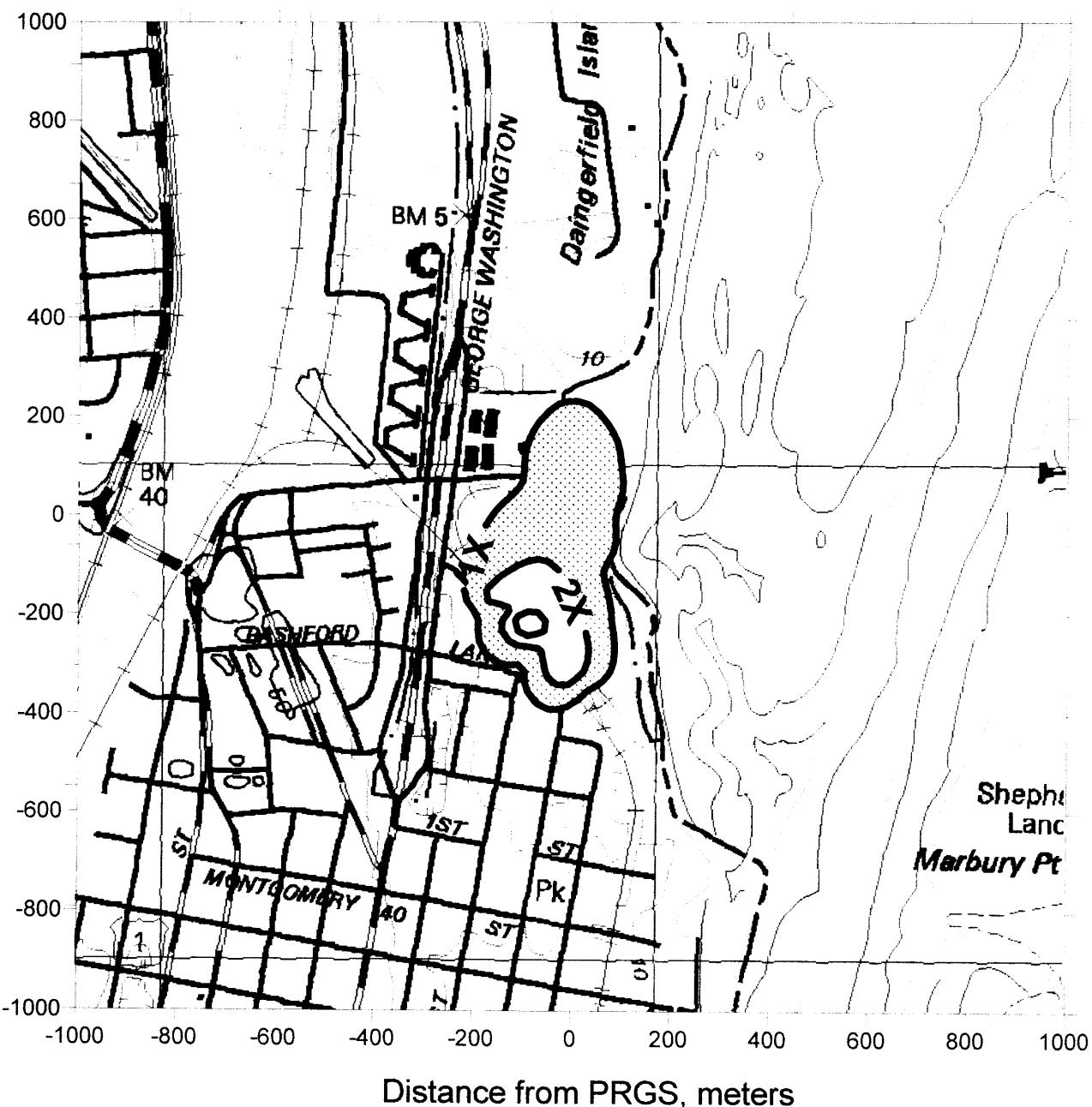


Figure 3-6. Maximum 3-hour SO₂ impacts (micrograms per cubic meter) including background shown as multiples of the standard. Impacts in shaded areas exceed the standard by two or more times.

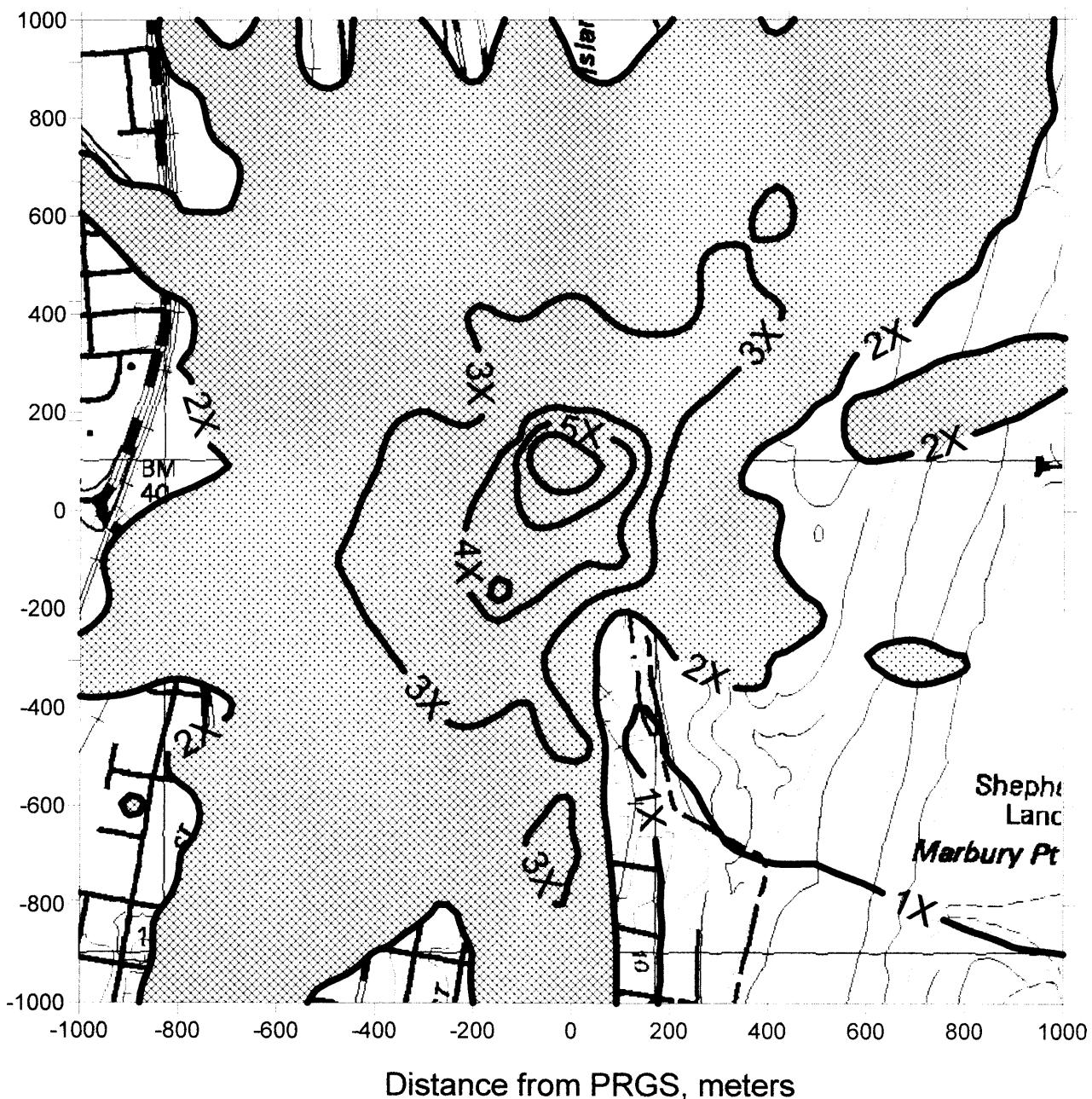


Figure 3-7. Maximum 24-hour SO₂ impacts (micrograms per cubic meter) including background shown as multiples of the standard. Impacts in shaded areas exceed the standard by three or more times.

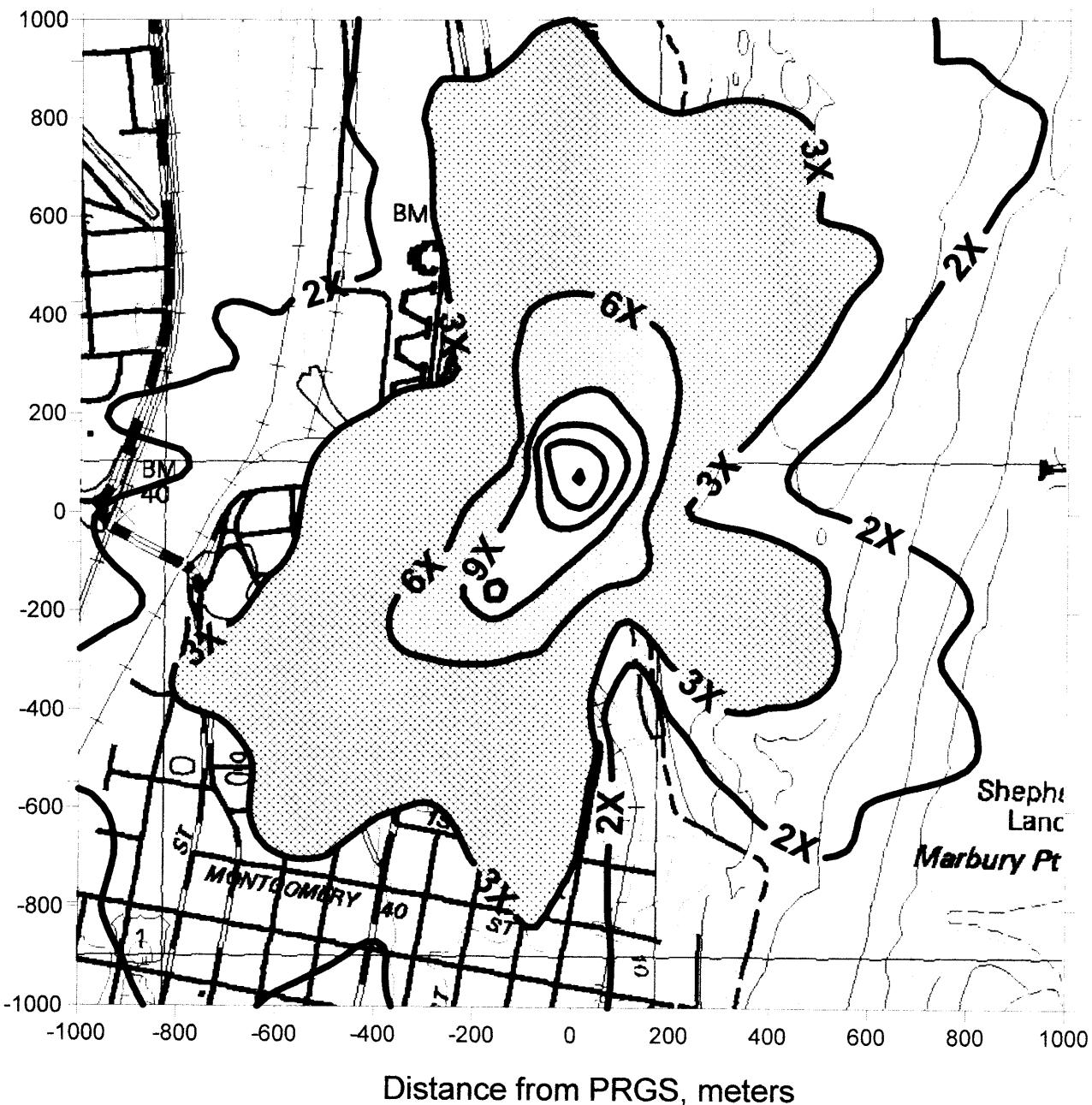


Figure 3-8. Annual SO₂ impacts (micrograms per cubic meter) including background shown as multiples of the standard. Impacts in shaded areas exceed the standard.

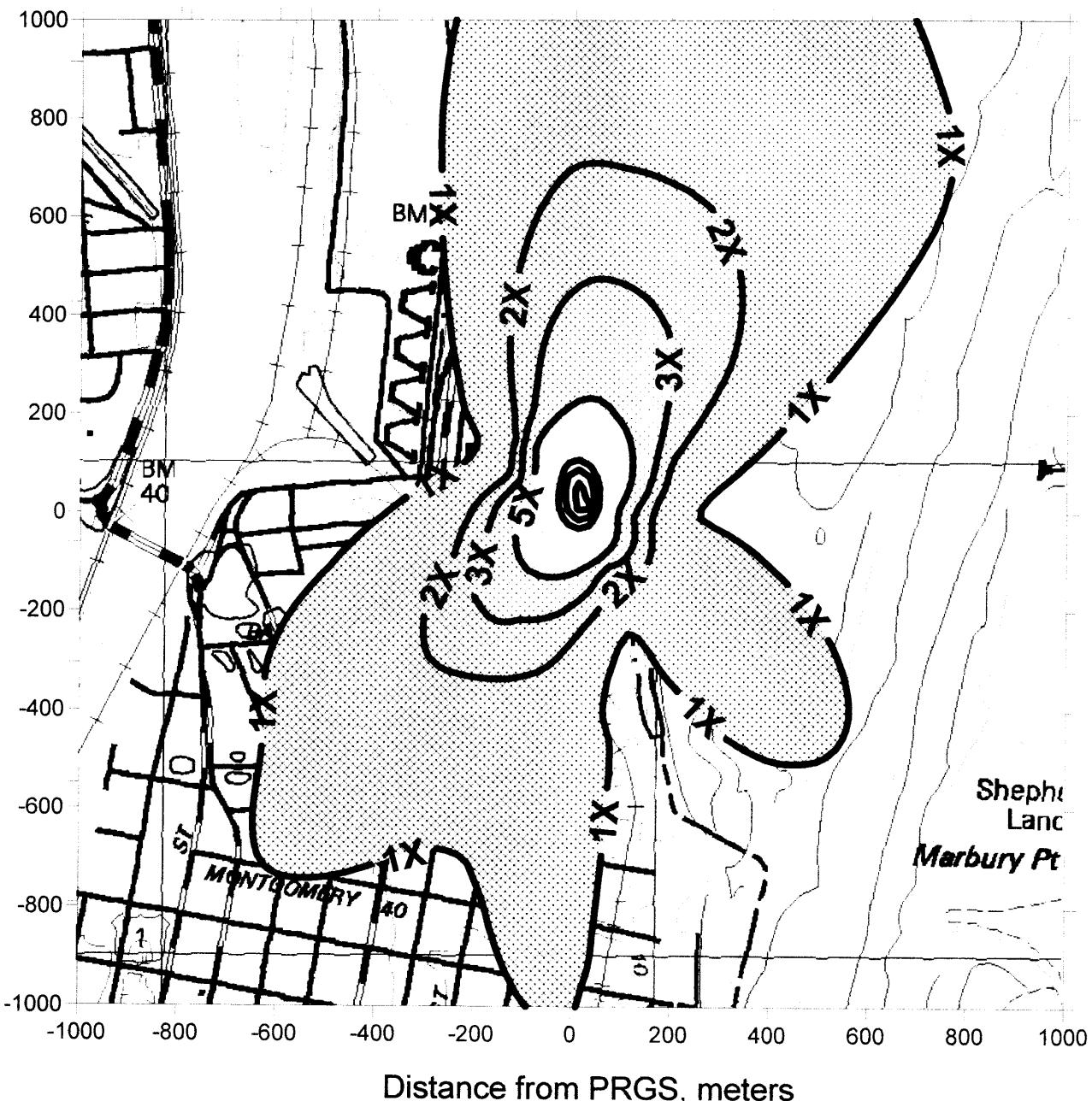


Table 3-3. Maximum Impacts at Multi-level Residences and Raised Commercial Structures (in micrograms per cubic meter).

Building/Facility	Address	Lvl.s.	X (m)	Y (m)	CO 1-hr	CO 8-hr ann.	NOx 24-hr ann.	PM 2.5 24-hr ann.	Maximum Impacts including Background ^(a)		
									PM10 ann.	3-hr ann.	SO2 24-hr ann.
					Background Value	4,924	3,206	45	39	15	42
					National and DEQ Ambient Air Quality Standard	40,000	10,000	100	65	150	50
Marina Towers ^(b)	Slater's Lane	13	-63	130	11709	8393	223	524	59	555	65
Potomac Shores Condo.	402 W. Bashford Lane	3	-80	280	7406	5151	97	230	33	287	56
Trans Potomac Building ^(c)	1199 N. Fairfax	10	20	-480	8074	4390	82	141	22	154	31
Dangerfield Island	north of Slater's Lane	2	20	520	8101	4908	112	194	31	202	36
Harbor Terrace Condo.	501 Bashford Lane	3	-280	-280	8005	5113	93	199	26	202	34
Potowmack Crossing	1600 W. Abingdon	3	-380	120	7782	4675	61	132	19	138	24
Mason Hall Apartments	1420 W. Abingdon Dr.	4	-480	-280	8473	4590	73	163	21	181	27
Radisson Hotel ^(c)	901 N. Fairfax	10	-80	-680	8824	4444	76	133	21	143	28
Port Royal Condo.	801 N. Pitt	17	-280	-780	8935	4540	62	114	20	118	24
Arbello Apartments	833 Bashford Lane	3	-680	-180	8143	4287	60	109	18	118	23
Sheraton Hotel ^(c)	801 N. St. Asaph	10	-380	-780	8292	4429	63	101	20	109	24
Alexandria House	498 Madison St.	22	-380	-880	10418	4244	62	99	19	105	23
Old Town Crescent Condo	828 Slater's Lane	4	-680	120	7786	4437	55	84	18	90	22
Meridian Building	1200 First St.	16	-880	-480	8156	4086	59	102	18	107	22
Potomac Club Apartments	1201 Braddock Pl.	3	-980	-580	7996	3993	57	90	18	97	22
Torpedo Factory Condo.	102 N. Union St.	6	-120	-1780	6953	3753	55	71	17	86	21
Carlyle House	2121 Jamison Av.	20	-380	-1680	8678	3830	53	64	17	71	21
Gunston Hall	815 S. Washington	3	-780	-2680	6401	3413	48	51	15	57	19
Hunting Point	1202 S. Wash. Pkwy	8	-980	-3080	6438	3423	47	49	15	55	19
Portals of Alexandria	601 Four Mile Rd	14	-2180	-2720	6706	3588	47	50	15	55	19
The Calvert Apartments	3110 Mt. Vernon Ave.	15	-2680	-1520	6692	3518	46	47	15	52	19
Carydale East	22 W. Taylor Run	18	-4180	-1480	6043	3354	45	49	15	52	19

Notes

- a) Results for CO from year 2001; all other results from year 2002.
 b) Six receptors represent Marina Towers at each of its 13 levels: (-63, 130) is the closest location to PRGS.
 c) Receptors limited to one rooftop receptor on commercial structures, representative of air intake location.

For sensitive receptors, maximum impacts of CO and NO₂ fall below the AAQS. However, for PM_{2.5}, PM₁₀ (short-term) and SO₂, impacts exceed AAQS. Table 3-4 below lists those sensitive receptors for which impacts of these pollutants are greatest.

Table 3-4. Maximum Total Impacts of PM_{2.5}, PM₁₀ and SO₂ (µg/cu.m.) at Sensitive Receptors with the Greatest Impacts.								
Location	PM_{2.5}		PM₁₀		SO₂			
	24-hr.	Ann.	24-hr.	Ann.	3-hr.	24-hr.	Ann.	
1300 Michigan Ave.	181.	25.	203.	31.	3,828.	2,076.	132.	
Pitt Street Station	196.	29.	274.	41.	3,887.	1,858.	148.	
Virginia Villlage	151.	23.	163.	28.	3,383.	1,527.	105.	
Canal Way	141.	24.	170.	31.	3,606.	1,304.	110.	
Chetworth Park	133.	20.	140.	25.	3,339.	1,284.	76.	
St. Anthony's Daycare	132.	24.	132.	32.	3,824.	1,150.	103.	
Old Town Gateway	132.	22.	140.	27.	3,406.	1,301.	98.	
Salvation Army	127.	20.	147.	26.	4,129.	1,455.	75.	
Giant Food Store	121.	22.	140.	28.	3,394.	1,081.	93.	
AAQS								
	65.	15.	150.	50.	1300.	365.	80.	
Notes: Values reflect one year of results (2002).								

3.2 Criteria Pollutants' Significant Impact Areas

Significance impact levels are defined by federal guidelines for ambient air quality standards analyses for each of the criteria pollutants; a source's impacts do not have to be reviewed against the AAQS in areas where its impacts fall below these significance levels. Table 3-5 below shows the greatest impact among all years for PRGS for each of the criteria pollutants at the most distant receptor ring modeled in this analysis. Comparison of the impacts of this analysis against the respective significant impact levels⁵⁸ shows that for all pollutants except SO₂, impacts either fall below or are very close to significance levels at the outermost border, i.e., the 7.5 kilometer radial ring. Although impacts of SO₂ exceed significance levels beyond 7.5 kilometers, final model results show that the general gradient of concentrations for all SO₂ averaging periods is negative from the innermost to outermost grid points, indicating that the receptor grid used in this analysis is expansive enough to capture the PRGS's worst-case impacts.

Table 3-5. Criteria Pollutants' Maximum Impact at Outermost Receptors (µg/cu.m.)										
CO		NO₂	PM_{2.5}		PM₁₀		SO₂			
1-hr	8-hr	Ann.	24-hr	Ann.	24-hr	Ann.	3-hr	24-hr	Ann.	
644.	110.	1.8	5.1	<1	5.4	<1	368.	87.	4.6	
Significance Levels										
2,000	500	1.0	5.0	1.0	5.0	1.0	25.0	5.0	1.0	

Notes: PM₁₀ and PM_{2.5} annual values fall below 1 micrograms per cubic meter at 5K.

3.3 Maximum Impacts of Toxic Air Pollutants

Table 3-6 below shows maximum impacts for the toxic air pollutants of HCL, HF, arsenic, cadmium and mercury. Among these pollutants, maximum impacts exceed the DEQ significance guidelines only for the acid gases; for HCL, maximum 1-hour impacts exceed

⁵⁸“New Source Review Workshop Manual,” US EPA, October, 1990.

the guideline level by a factor of five, while for HF, maximum 1-hour impacts exceed the guideline level by approximately 25%. Appendix B includes a list of toxic air pollutants for which impacts were evaluated; impacts for these other pollutants fall below significance guidelines. Maximum impacts occur either at Marina Towers (all short-term results) or along the facility's northeast fence line. The results of Table 3-6 also do not reflect the highest reported heat input values for each of the boilers. A reasonable estimate of how these impacts would increase with the highest heat input values equals approximately 3% to 5%. However, this increase would not affect the overall conclusions of compliance to the guideline standard for each pollutant.

Table 3-6. Toxic Air Pollutants' Maximum Impacts ($\mu\text{g}/\text{cu.m.}$) ^(a)							
Maximum Modeled Impacts							
HCL	HF	Arsenic		Cadmium		Mercury	
1-hour	1-hour	1-hour	Ann.	1-hour	Ann.	1-hour	Ann.
386.	50.	0.13	0.01	0.02	0.001	0.43	0.03
Ambient Background Levels ^(b)							
--	--	--	0.0003	--	0.00021	--	0.0028
Total Maximum Impact							
386.	50.	0.13	0.01	0.02	0.0012	0.43	0.033
DEQ Guideline Standard							
75	41	0.5	0.02	10	0.40	1.3	0.05
Location of Maximum (meters)							
(-63,130)	(-63,130)	(-63,160)	(13,60)	(-63,130)	(13,60)	(-63,130)	(13,60)
Receptor Height (meters)							
7.9	7.9	7.9	0.0	7.9	0.0	7.9	0.0

Notes:(a) Annual values reflect a capacity factor consistent with 2002/2003's operation.
(b) Ambient background levels are available only for annual periods for arsenic, cadmium and mercury.

Table 3-7 below lists those sensitive receptors for which impacts of the toxic air pollutants are greatest. These results show that exceedances of the HCL 1-hour standard are widespread, extending to distances beyond one kilometer from the southern fence line (YMCA location), and beyond distances of at least 700 meters from the northwestern fence line (National Media Center). None of these sensitive receptors show exceedances of any of the TAPs except HCL.

Table 3-7. Maximum 1-hour Impacts of HCL and HF among Sensitive Receptors ($\mu\text{g}/\text{cu.m.}$), including Background.

	Location (meters)	HCL	HF	Mercury
Chetworth Park	(-580, -180)	333	25	0.22
Powhaton Park	(-680, -480)	326	25	0.21
Michigan Avenue	(-380, -280)	318	24	0.21
Carpenter's Shelter	(-880, -580)	312	24	0.20
Gorham Tract	(-480, 20)	312	24	0.20
Virginia Village	(-480, -380)	306	23	0.20
YMCA	(-1380, 120)	302	23	0.20
National Media Ctr.	(-680, 420)	300	23	0.19
Giant Food Store	(-280, -580)	298	23	0.19
Westover	(-380, -780)	289	22	0.19
Significance Guideline				
	75	41	1.30	

3.3 Conclusion

Based on the identified emissions and site characteristics, these AERMOD results show that the PRGS's emissions result in a broad geographic area of noncompliance with the health-based standards for all of the criteria pollutants of this analysis except C0. These areas of noncompliance extend to between hundreds of meters to over one kilometer beyond the facility's fenceline. In an evaluation of AERMOD's capability to reproduce observed impacts, US EPA found that for seven studies where downwash effects occurred, for short-term concentrations the ratio of AERMOD's (with PRIME) predicted concentration to measured concentrations equaled 97% on average.⁵⁹ Therefore, based on the US EPA's evaluation of AERMOD, the results of this analysis may even represent slight underestimations of the PRGS's impacts in adjacent residential areas.⁶⁰

While the scope of this analysis conforms to that of a NAAQS analysis, thereby focusing on the maximum impacts among receptors and time periods throughout the simulated years (for example, the representative maximum among the 365 or 366 24-hour periods and among 700 receptors), AERMOD can be applied to provide the frequency of occurrence of exceedances of the health-based standard at each of the receptors. Given the very large margin between the short-term health-based standards for PM_{2.5}, PM₁₀ and SO₂ and the calculated impacts for all years of the analysis, i.e., five to eighteen times the compliance value, it is likely that (and limited analysis to date shows this) that there is a high frequency of occurrence of concentrations in excess of standards in residential areas to the southwest of the facility and at Marina Towers. For annual periods, these results based on actual emissions, actual load characteristics, and actual meteorological conditions, indicate that residents in these areas are chronically exposed to concentrations in excess of health-based standards.

⁵⁹ AERMOD: Latest Features and Evaluation Results," US EPA, June, 2003.

⁶⁰ Comparison of predicted impacts to monitored results offer some opportunity for evaluation of these results: although monitoring results are available in Alexandria, depending on wind direction results are impacted by other sources in the area. However, for SO₂, for which area sources are expected to be minimal, and analysis of other major interacting sources shows very little impact in this area of Alexandria, comparison of SO₂ results to monitored concentrations indicate fairly good agreement. For the SO₂ monitor located at 517 North St. Asaph Street, annual monitoring results for each of the years 2002, 2003 and 2004 equal 16 micrograms per cubic meter, while for that location, or approximately 1.1 kilometers along the 200-degree radial, this analysis shows a value of approximately 33 micrograms per cubic meter. However, for this analysis, for the 240-degree radial the receptor at 1.1 kilometers shows a result equivalent to the monitored result. Differences between actual wind direction at the PRGS site versus the wind direction at Reagan National Airport, from where surface wind measurements derive, could account for this result.

'PRGS 5 MAIN STACKS, 2 SILO STACKS AND MARINA TOWERS; PRIME'
'p'
'METERS' 1.0
'UTMN' 0.00
5
'BLR&ESPS' 1 10.4
10 35.3
15 50
-3 -5
38 -10
20 -110
-18 -98
-25 -115
-80 -98
-58 35
-30 30
-25 58
'TRBBLDG' 1 10.4
4 23.0
-55 45
-83 -113
-110 -110
-83 48
'SILO-3' 1 10.4
4 31.0
-33 -140
-25 -133
-18 -140
-25 -148
'SILO1&2' 1 10.4
4 33.6
-33 -165
-13 -145
8 -165
-13 -185
'MARINATW' 1 10.4
9 39.6
-90 243
-60 235
-73 180
-25 138
-50 118
-100 155
-133 140
-148 163
-100 185
7
'BOILER5' 10.4 48.2 0. 0.
'BOILER4' 10.4 48.2 -3. -23.
'BOILER3' 10.4 48.2 -5. -45.
'BOILER2' 10.4 48.2 -8. -68.
'BOILER1' 10.4 48.2 -10. -90.
'PBSILOS' 10.4 31.0 -25. -140.
'PFSILOS' 10.4 33.6 -13. -165.
0

PRGS 5 MAIN STACKS, 2 SILO STACKS AND MARINA TOWERS; PRIME

BPIP (Dated: 04274)

DATE : 7/ 1/2005

TIME : 11:47:32

PRGS 5 MAIN STACKS, 2 SILO STACKS AND MARINA TOWERS; PRIME

=====

BPIP PROCESSING INFORMATION:

=====

The p flag has been set for preparing downwash related data
for a model run utilizing the PRIME algorithm.

Inputs entered in METERS will be converted to meters using
a conversion factor of 1.0000. Output will be in meters.

UTMP is set to UTMN. The input is assumed to be in a local
X-Y coordinate system as opposed to a UTM coordinate system.
True North is in the positive Y direction.

Plant north is set to 0.00 degrees with respect to True North.

PRGS 5 MAIN STACKS, 2 SILO STACKS AND MARINA TOWERS; PRIME

PRELIMINARY* GEP STACK HEIGHT RESULTS TABLE
(Output Units: meters)

Stack	Stack	Base Elevation	GEP**	Preliminary*
Name	Height	Differences	EQN1	Stack Height Value
BOILER5	48.20	0.00	99.00	99.00
BOILER4	48.20	0.00	99.00	99.00
BOILER3	48.20	0.00	99.00	99.00
BOILER2	48.20	0.00	99.00	99.00
BOILER1	48.20	0.00	88.25	88.25
PBSILOS	31.00	0.00	88.25	88.25
PFSILOS	33.60	0.00	88.25	88.25

* Results are based on Determinants 1 & 2 on pages 1 & 2 of the GEP

Technical Support Document. Determinant 3 may be investigated for additional stack height credit. Final values result after Determinant 3 has been taken into consideration.

** Results were derived from Equation 1 on page 6 of GEP Technical Support Document. Values have been adjusted for any stack-building base elevation differences.

Note: Criteria for determining stack heights for modeling emission limitations for a source can be found in Table 3.1 of the GEP Technical Support Document.

BPIP (Dated: 04274)

DATE : 7/ 1/2005

TIME : 11:47:32

PRGS 5 MAIN STACKS, 2 SILO STACKS AND MARINA TOWERS; PRIME

BPIP output is in meters

SO BUILDHGT BOILERS	35.30	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT BOILERS	35.30	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT BOILERS	35.30	39.60	39.60	39.60	39.60	39.60	35.30
SO BUILDHGT BOILERS	35.30	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT BOILERS	35.30	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT BOILERS	35.30	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT BOILERS	35.30	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDWID BOILER5	102.36	122.89	140.05	152.96	161.21	167.99	
SO BUILDWID BOILER5	173.26	173.26	173.00	170.37	171.57	175.67	
SO BUILDWID BOILER5	174.44	116.99	112.21	107.32	116.79	118.00	
SO BUILDWID BOILER5	102.36	122.89	140.05	152.96	161.21	167.99	
SO BUILDWID BOILER5	173.26	173.26	173.00	170.37	171.57	175.67	
SO BUILDWID BOILER5	174.44	167.91	156.27	140.98	131.49	118.00	
SO BUILDLEN BOILER5	170.37	171.57	175.67	174.44	167.91	156.27	
SO BUILDLEN BOILER5	140.98	131.49	118.00	102.36	122.89	140.05	
SO BUILDLEN BOILER5	152.96	122.22	128.25	131.14	130.05	173.00	
SO BUILDLEN BOILER5	170.37	171.57	175.67	174.44	167.91	156.27	
SO BUILDLEN BOILER5	140.98	131.49	118.00	102.36	122.89	140.05	
SO BUILDLEN BOILER5	152.96	161.21	167.99	173.26	173.26	173.00	
SO XBADJ BOILER5	-117.59	-119.45	-124.87	-126.50	-124.28	-118.28	
SO XBADJ BOILER5	-108.69	-95.80	-80.00	-63.20	-66.47	-67.73	

SO XBADJ	BOILER5	-66.93	-244.00	-255.44	-259.13	-254.94	-58.00
SO XBADJ	BOILER5	-52.78	-52.11	-50.80	-47.94	-43.63	-37.99
SO XBADJ	BOILER5	-32.29	-35.69	-38.00	-39.16	-56.42	-72.32
SO XBADJ	BOILER5	-86.03	-97.12	-105.26	-110.21	-111.80	-115.00
SO YBADJ	BOILER5	12.02	5.03	-2.30	-9.55	-16.51	-21.27
SO YBADJ	BOILER5	-23.58	-25.17	-28.50	-32.41	-33.67	-37.03
SO YBADJ	BOILER5	-39.28	46.60	9.43	-29.67	-59.05	-21.00
SO YBADJ	BOILER5	-12.02	-5.03	2.30	9.55	16.51	21.27
SO YBADJ	BOILER5	23.58	25.17	28.50	32.41	33.67	37.03
SO YBADJ	BOILER5	39.28	40.32	40.15	38.20	30.06	21.00

SO BUILDHGT	BOILER4	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT	BOILER4	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT	BOILER4	35.30	39.60	39.60	39.60	39.60	35.30
SO BUILDHGT	BOILER4	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT	BOILER4	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT	BOILER4	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDWID	BOILER4	102.36	122.89	140.05	152.96	161.21	167.99
SO BUILDWID	BOILER4	173.26	173.26	173.00	170.37	171.57	175.67
SO BUILDWID	BOILER4	174.44	116.99	112.21	107.32	116.79	118.00
SO BUILDWID	BOILER4	102.36	122.89	140.05	152.96	161.21	167.99
SO BUILDWID	BOILER4	173.26	173.26	173.00	170.37	171.57	175.67
SO BUILDWID	BOILER4	174.44	167.91	156.27	140.98	131.49	118.00
SO BUILDLEN	BOILER4	170.37	171.57	175.67	174.44	167.91	156.27
SO BUILDLEN	BOILER4	140.98	131.49	118.00	102.36	122.89	140.05
SO BUILDLEN	BOILER4	152.96	122.22	128.25	131.14	130.05	173.00
SO BUILDLEN	BOILER4	170.37	171.57	175.67	174.44	167.91	156.27
SO BUILDLEN	BOILER4	140.98	131.49	118.00	102.36	122.89	140.05
SO BUILDLEN	BOILER4	152.96	161.21	167.99	173.26	173.26	173.00
SO XBADJ	BOILER4	-94.42	-96.81	-103.45	-106.95	-107.19	-104.18
SO XBADJ	BOILER4	-98.01	-88.85	-77.00	-64.24	-71.52	-76.63
SO XBADJ	BOILER4	-79.41	-259.69	-273.86	-279.71	-277.07	-81.00
SO XBADJ	BOILER4	-75.95	-74.75	-72.22	-67.49	-60.71	-52.09
SO XBADJ	BOILER4	-42.97	-42.63	-41.00	-38.12	-51.37	-63.42
SO XBADJ	BOILER4	-73.54	-81.43	-86.84	-89.62	-89.67	-92.00
SO YBADJ	BOILER4	13.06	10.08	6.61	2.94	-0.82	-2.85
SO YBADJ	BOILER4	-2.99	-3.04	-5.50	-9.24	-11.03	-15.62
SO YBADJ	BOILER4	-19.73	63.68	23.53	-18.98	-52.10	-18.00
SO YBADJ	BOILER4	-13.06	-10.08	-6.61	-2.94	0.82	2.85
SO YBADJ	BOILER4	2.99	3.04	5.50	9.24	11.03	15.62
SO YBADJ	BOILER4	19.73	23.24	26.05	27.52	23.11	18.00

SO BUILDHGT BOILER3 35.30 35.30 35.30 35.30 35.30 35.30

SO BUILDHGT BOILER3	35.30	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT BOILER3	35.30	35.30	39.60	39.60	39.60	35.30	
SO BUILDHGT BOILER3	35.30	35.30	35.30	35.30	35.30	35.30	
SO BUILDHGT BOILER3	35.30	35.30	35.30	35.30	35.30	35.30	
SO BUILDHGT BOILER3	35.30	35.30	35.30	35.30	35.30	35.30	
SO BUILDWID BOILERS3	102.36	122.89	140.05	152.96	161.21	167.99	
SO BUILDWID BOILER3	173.26	173.26	173.00	170.37	171.57	175.67	
SO BUILDWID BOILER3	174.44	167.91	112.21	107.32	116.79	118.00	
SO BUILDWID BOILER3	102.36	122.89	140.05	152.96	161.21	167.99	
SO BUILDWID BOILER3	173.26	173.26	173.00	170.37	171.57	175.67	
SO BUILDWID BOILER3	174.44	167.91	156.27	140.98	131.49	118.00	
SO BUILDLEN BOILER3	170.37	171.57	175.67	174.44	167.91	156.27	
SO BUILDLEN BOILER3	140.98	131.49	118.00	102.36	122.89	140.05	
SO BUILDLEN BOILER3	152.96	161.21	128.25	131.14	130.05	173.00	
SO BUILDLEN BOILER3	170.37	171.57	175.67	174.44	167.91	156.27	
SO BUILDLEN BOILER3	140.98	131.49	118.00	102.36	122.89	140.05	
SO BUILDLEN BOILER3	152.96	161.21	167.99	173.26	173.26	173.00	
SO XBADJ BOILER3	-72.41	-75.46	-83.40	-88.81	-91.52	-91.45	
SO XBADJ BOILER3	-88.60	-83.06	-75.00	-66.09	-77.17	-85.90	
SO XBADJ BOILER3	-92.02	-95.35	-291.92	-299.70	-298.38	-103.00	
SO XBADJ BOILER3	-97.96	-96.11	-92.27	-85.63	-76.39	-64.82	
SO XBADJ BOILER3	-52.38	-48.42	-43.00	-36.27	-45.72	-54.15	
SO XBADJ BOILER3	-60.93	-65.86	-68.79	-69.63	-68.35	-70.00	
SO YBADJ BOILER3	14.91	15.72	15.87	15.55	14.74	15.20	
SO YBADJ BOILER3	17.00	18.28	16.50	12.78	10.33	4.44	
SO YBADJ BOILER3	-1.59	-7.57	36.26	-9.58	-46.31	-16.00	
SO YBADJ BOILER3	-14.91	-15.72	-15.87	-15.55	-14.74	-15.20	
SO YBADJ BOILER3	-17.00	-18.28	-16.50	-12.78	-10.33	-4.44	
SO YBADJ BOILER3	1.59	7.57	13.32	18.11	17.32	16.00	

SO BUILDHGT BOILER2	35.30	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT BOILER2	35.30	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT BOILER2	35.30	35.30	39.60	39.60	39.60	39.60	
SO BUILDHGT BOILER2	35.30	35.30	35.30	35.30	35.30	35.30	
SO BUILDHGT BOILER2	35.30	35.30	35.30	35.30	35.30	35.30	
SO BUILDHGT BOILER2	35.30	35.30	35.30	35.30	35.30	35.30	
SO BUILDWID BOILER2	102.36	122.89	140.05	152.96	161.21	167.99	
SO BUILDWID BOILER2	173.26	173.26	173.00	170.37	171.57	175.67	
SO BUILDWID BOILER2	174.44	167.91	112.21	107.32	116.79	123.00	
SO BUILDWID BOILER2	102.36	122.89	140.05	152.96	161.21	167.99	
SO BUILDWID BOILER2	173.26	173.26	173.00	170.37	171.57	175.67	
SO BUILDWID BOILER2	174.44	167.91	156.27	140.98	131.49	118.00	
SO BUILDLEN BOILER2	170.37	171.57	175.67	174.44	167.91	156.27	
SO BUILDLEN BOILER2	140.98	131.49	118.00	102.36	122.89	140.05	

SO BUILDLEN BOILER2	152.96	161.21	128.25	131.14	130.05	125.00
SO BUILDLEN BOILER2	170.37	171.57	175.67	174.44	167.91	156.27
SO BUILDLEN BOILER2	140.98	131.49	118.00	102.36	122.89	140.05
SO BUILDLEN BOILER2	152.96	161.21	167.99	173.26	173.26	173.00
SO XBADJ BOILER2	-49.24	-52.82	-61.98	-69.26	-74.44	-77.35
SO XBADJ BOILER2	-77.92	-76.12	-72.00	-67.13	-82.21	-94.80
SO XBADJ BOILER2	-104.51	-111.04	-310.33	-320.29	-320.51	-311.00
SO XBADJ BOILER2	-121.13	-118.75	-113.69	-105.18	-93.47	-78.92
SO XBADJ BOILER2	-63.06	-55.37	-46.00	-35.23	-40.68	-45.25
SO XBADJ BOILER2	-48.45	-50.17	-50.37	-49.04	-46.22	-47.00
SO YBADJ BOILER2	15.95	20.77	24.78	28.03	30.44	33.62
SO YBADJ BOILER2	37.59	40.41	39.50	35.95	32.97	25.86
SO YBADJ BOILER2	17.96	9.51	50.36	1.11	-39.37	-78.50
SO YBADJ BOILER2	-15.95	-20.77	-24.78	-28.03	-30.44	-33.62
SO YBADJ BOILER2	-37.59	-40.41	-39.50	-35.95	-32.97	-25.86
SO YBADJ BOILER2	-17.96	-9.51	-0.78	7.43	10.37	13.00

SO BUILDHGT BOILER1	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT BOILER1	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT BOILER1	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT BOILER1	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT BOILER1	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT BOILER1	35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDWID BOILER1	102.36	122.89	140.05	152.96	161.21	167.99
SO BUILDWID BOILER1	173.26	173.26	173.00	170.37	171.57	175.67
SO BUILDWID BOILER1	174.44	167.91	156.27	140.98	131.49	118.00
SO BUILDWID BOILER1	102.36	122.89	140.05	152.96	161.21	167.99
SO BUILDWID BOILER1	173.26	173.26	173.00	170.37	171.57	175.67
SO BUILDWID BOILER1	174.44	167.91	156.27	140.98	131.49	118.00
SO BUILDLEN BOILER1	170.37	171.57	175.67	174.44	167.91	156.27
SO BUILDLEN BOILER1	140.98	131.49	118.00	102.36	122.89	140.05
SO BUILDLEN BOILER1	152.96	161.21	167.99	173.26	173.26	173.00
SO BUILDLEN BOILER1	170.37	171.57	175.67	174.44	167.91	156.27
SO BUILDLEN BOILER1	140.98	131.49	118.00	102.36	122.89	140.05
SO BUILDLEN BOILER1	152.96	161.21	167.99	173.26	173.26	173.00
SO XBADJ BOILER1	-27.22	-31.46	-41.93	-51.12	-58.77	-64.62
SO XBADJ BOILER1	-68.51	-70.33	-70.00	-68.98	-87.86	-104.07
SO XBADJ BOILER1	-117.12	-126.61	-135.67	-144.20	-148.36	-148.00
SO XBADJ BOILER1	-143.15	-140.11	-133.74	-123.32	-109.14	-91.65
SO XBADJ BOILER1	-72.47	-61.16	-48.00	-33.38	-35.03	-35.98
SO XBADJ BOILER1	-35.84	-34.60	-32.32	-29.05	-24.91	-25.00
SO YBADJ BOILER1	17.80	26.41	34.04	40.64	46.00	51.68
SO YBADJ BOILER1	57.58	61.73	61.50	57.96	54.32	45.91
SO YBADJ BOILER1	36.10	25.19	13.51	1.98	-4.58	-11.00

SO YBADJ	BOILER1	-17.80	-26.41	-34.04	-40.64	-46.00	-51.68
SO YBADJ	BOILER1	-57.58	-61.73	-61.50	-57.96	-54.32	-45.91
SO YBADJ	BOILER1	-36.10	-25.19	-13.51	-1.98	4.58	11.00
SO BUILDHGT PBSILOS		35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT PBSILOS		35.30	33.60	33.60	33.60	33.60	35.30
SO BUILDHGT PBSILOS		35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT PBSILOS		35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT PBSILOS		35.30	33.60	33.60	33.60	33.60	35.30
SO BUILDHGT PBSILOS		35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT PBSILOS		102.36	122.89	140.05	152.96	161.21	167.99
SO BUILDWID PBSILOS		173.26	39.39	40.00	39.39	37.59	175.67
SO BUILDWID PBSILOS		174.44	167.91	156.27	140.98	131.49	118.00
SO BUILDWID PBSILOS		102.36	122.89	140.05	152.96	161.21	167.99
SO BUILDWID PBSILOS		173.26	39.39	40.00	39.39	37.59	175.67
SO BUILDWID PBSILOS		174.44	167.91	156.27	140.98	131.49	118.00
SO BUILDLEN PBSILOS		170.37	171.57	175.67	174.44	167.91	156.27
SO BUILDLEN PBSILOS		140.98	40.38	41.00	40.38	38.53	140.05
SO BUILDLEN PBSILOS		152.96	161.21	167.99	173.26	173.26	173.00
SO BUILDLEN PBSILOS		170.37	171.57	175.67	174.44	167.91	156.27
SO BUILDLEN PBSILOS		140.98	40.38	41.00	40.38	38.53	140.05
SO BUILDLEN PBSILOS		152.96	161.21	167.99	173.26	173.26	173.00
SO XBADJ	PBSILOS	24.62	20.66	8.87	-3.18	-15.14	-26.63
SO XBADJ	PBSILOS	-37.32	-12.22	-8.00	-3.54	1.03	-116.08
SO XBADJ	PBSILOS	-137.77	-155.27	-171.47	-186.06	-194.99	-198.00
SO XBADJ	PBSILOS	-194.99	-192.22	-184.54	-171.26	-152.77	-129.64
SO XBADJ	PBSILOS	-103.66	-28.16	-33.00	-36.84	-39.56	-23.97
SO XBADJ	PBSILOS	-15.19	-5.94	3.48	12.80	21.73	25.00
SO YBADJ	PBSILOS	11.71	29.42	46.05	61.29	74.66	87.48
SO YBADJ	PBSILOS	99.43	-26.70	-25.00	-22.54	-19.39	96.71
SO YBADJ	PBSILOS	84.04	68.82	51.50	33.17	18.87	4.00
SO YBADJ	PBSILOS	-11.71	-29.42	-46.05	-61.29	-74.66	-87.48
SO YBADJ	PBSILOS	-99.43	26.70	25.00	22.54	19.39	-96.71
SO YBADJ	PBSILOS	-84.04	-68.82	-51.50	-33.17	-18.87	-4.00
SO BUILDHGT PFSILOS		35.30	35.30	35.30	35.30	33.60	33.60
SO BUILDHGT PFSILOS		33.60	33.60	33.60	33.60	33.60	33.60
SO BUILDHGT PFSILOS		35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDHGT PFSILOS		35.30	35.30	35.30	35.30	33.60	33.60
SO BUILDHGT PFSILOS		33.60	33.60	33.60	33.60	33.60	33.60
SO BUILDHGT PFSILOS		35.30	35.30	35.30	35.30	35.30	35.30
SO BUILDWID PFSILOS		102.36	122.89	140.05	152.96	197.46	34.64
SO BUILDWID PFSILOS		37.59	39.39	40.00	39.39	37.59	34.64

SO BUILDWID	PFSILOS	174.44	167.91	156.27	140.98	131.49	118.00
SO BUILDWID	PFSILOS	102.36	122.89	140.05	152.96	197.46	34.64
SO BUILDWID	PFSILOS	37.59	39.39	40.00	39.39	37.59	34.64
SO BUILDWID	PFSILOS	174.44	167.91	156.27	140.98	131.49	118.00
SO BUILDLEN	PFSILOS	170.37	171.57	175.67	174.44	174.97	35.51
SO BUILDLEN	PFSILOS	38.53	40.38	41.00	40.38	38.53	35.51
SO BUILDLEN	PFSILOS	152.96	161.21	167.99	173.26	173.26	173.00
SO BUILDLEN	PFSILOS	170.37	171.57	175.67	174.44	174.97	35.51
SO BUILDLEN	PFSILOS	38.53	40.38	41.00	40.38	38.53	35.51
SO BUILDLEN	PFSILOS	152.96	161.21	167.99	173.26	173.26	173.00
SO XBADJ	PFSILOS	47.16	40.04	24.52	8.26	-15.32	-17.32
SO XBADJ	PFSILOS	-18.79	-19.70	-20.00	-19.70	-18.79	-17.32
SO XBADJ	PFSILOS	-163.03	-182.13	-199.12	-213.66	-221.70	-223.00
SO XBADJ	PFSILOS	-217.53	-211.61	-200.20	-182.70	-159.65	-18.19
SO XBADJ	PFSILOS	-19.73	-20.68	-21.00	-20.68	-19.73	-18.19
SO XBADJ	PFSILOS	10.07	20.92	31.13	40.40	48.43	50.00
SO YBADJ	PFSILOS	27.87	49.25	68.95	86.55	83.41	0.00
SO YBADJ	PFSILOS	0.00	0.00	0.00	0.00	0.00	0.00
SO YBADJ	PFSILOS	95.48	75.70	53.61	30.45	11.40	-8.00
SO YBADJ	PFSILOS	-27.87	-49.25	-68.95	-86.55	-83.41	0.00
SO YBADJ	PFSILOS	0.00	0.00	0.00	0.00	0.00	0.00
SO YBADJ	PFSILOS	-95.48	-75.70	-53.61	-30.45	-11.40	8.00

Appendix B

Additional Calculations

Maximum Impacts of Criteria Pollutants in Excess of Standards at Sensitive Receptors (micrograms per cubic meter).

Building/Facility	Address	X (m)	Y (m)	Maximum Impacts Including Background							
				NOx ann.	PM2.5 24-hr	PM10 24-hr	ann.	NOx ann.	PM2.5 24-hr	PM10 24-hr	ann.
National/Ambient Air Quality Standard											
Portner House Condo.	621 N. St. Asaph	-480	-980	45	39	15	42	19	238	60	16
Station Square Condo.	1423 Powhatan St.	-680	-80	100	65	15	150	50	1300	365	80
Blessed Sacrament School	1417 W. Braddock St.	-3580	720	46	49	15	52	19	1,362	632	58
Geo. Washington Middle Sch	1005 Mt. Vernon	-1380	-380	52	71	17	76	21	2,117	486	35
Jefferson Houston Elem. Sch	102 N. Union St.	-1280	-1380	54	70	17	78	21	2,023	474	39
Maury School	1417 W. Braddock	-2180	-780	49	58	16	63	19	1,547	305	26
Mount Vernon Elem. School	2600 Commonwealth	-1680	920	48	56	15	61	19	1,594	328	24
Old Town Montessori	115 S. Washington Street	-680	-1780	51	62	16	71	21	1,539	333	31
St. Mary's School	400 Green St.	-580	-2780	48	54	15	60	19	1,250	243	25
St. Rita School	3801 Russell Road	-2080	2120	46	49	15	54	19	1,118	207	20
Ladrey Senior Building	300 Wythe St.	20	-1080	67	94	20	113	26	3,050	933	75
Woodbine Convalescent	2729 King St.	-2980	-580	46	45	15	49	19	1,542	265	20
Alexandria Comm. Shelter	2355 Mill Road	-2380	-1980	48	54	15	57	19	1,242	247	24
Carpenter's Shelter	930 N. Henry	-880	-580	60	95	18	104	23	2,779	793	57
Charles Houston Recreation	901 Wythe Street	-780	-880	64	94	19	103	24	2,697	858	66
City Hall	301 King St.	-180	-1780	55	76	17	90	22	2,325	557	43
Nannie J. Lee Center	1108 Jefferson Street	-1280	-2480	48	50	15	56	19	1,042	217	25
Angel Park	E. Taylor Run/W. Taylor Run	-3080	-1480	47	47	15	51	19	1,419	257	21
Chetworth Park	south of Chetworth Pl.	-580	-180	67	133	20	140	25	3,339	1,284	76
Founders Park	200-400 N. Union St.	120	-1680	56	70	17	82	22	2,263	434	45
Powhatan Park	north of Vernon St.	-680	-480	66	109	20	124	24	3,062	1,063	73
Canal Way	1100 N. Pitt Street	-180	-480	80	141	24	170	31	3,606	1,304	110
Chetworth Place	700-800 Chetworth Place	20	-1780	57	75	18	88	23	2,323	575	49
Gorham Tract	700-800 Bernard St.	-480	20	64	108	19	117	24	3,712	1,077	66
Michigan Avenue	1300 Michigan	-380	-280	88	181	25	203	31	3,828	2,076	132

Maximum Impacts of Criteria Pollutants in Excess of Standards at Sensitive Receptors (micrograms per cubic meter).

Building/Facility	Address	X (m)	Y (m)	Maximum Impacts Including Background						
				NOx ann.	PM2.5 24-hr	PM10 ann.	3-hr	24-hr ann.	SO2	
				Background Value	45	39	15	42	19	238
				National Ambient Air Quality Standard	100	65	15	150	50	1300
Old Town Gateway	900 Powhatan St.	-480	-580	75	132	22	140	27	3,406	1,301
Pitt Street Station	1200 N. Pitt St.	-80	-380	94	196	29	274	41	3,887	1,858
Partner's Landing	600 N. Pitt St.	-280	-1080	60	79	19	91	23	2,012	708
Rivergate Place	100 Madison Pl.	120	-980	61	78	19	92	24	2,081	544
Tobacco Quay	500 N. Fairfax	-80	-1380	62	82	19	104	24	2,433	708
Virginia Village	north of Second St.	-480	-380	78	151	23	164	28	3,383	1,527
Westover	1000-1200 Colonial	-380	-780	66	98	20	112	25	2,858	793
Yates Garden	800 S. Lee Street	-180	-2580	51	60	15	69	21	1,663	384
Shad Row Condo	600 Pendleton St.	-480	-1080	58	43	18	90	23	2,373	593
Caylor Gardens	1701 Commonwealth	-1880	220	48	57	15	62	19	1,708	328
Giant Food Store	500 First Street	-280	-580	74	121	22	140	28	3,394	1,081
Masonic Temple	101 Callahan Dr.	-2080	-2480	48	52	15	57	19	1,366	250
National Media Center	815 Slaters Lane	-680	420	56	82	17	91	22	3,249	761
Salvation Army HQ	615 Slaters Lane	-280	120	67	127	20	147	26	4,129	1,455
St. Anthony's Day Care	319 First St.	20	-580	78	132	24	173	32	3,824	1,150
YMCA	420 E. Monroe	-1380	120	50	63	16	68	20	2,155	507
Arlandria Health Center for W	3801 Exec. Avenue	-2080	2120	46	49	15	54	19	1,118	207
Alexandria Health Dept. P.C. & Adolescent Health Center & INOVA/Alex.	517 N. St. Asaph	-380	-1180	57	77	18	94	22	2,040	657
Family Care Medical Center C4810 Bearregard Street	-7380	620	45	42	15	45	19	19	440	101
Queen Street Clinic	1000 Queen Street	-880	-1380	54	73	17	80	22	2,441	511
Jefferson Memorial Hospital	4600 King Street	-5580	2420	45	41	15	44	19	2,658	93
St. Martin de Porres Senior C	4650 Taney Avenue	-6280	-180	45	41	15	44	19	363	89
Goodwin House	4800 Fillmore	-6280	1920	45	42	15	45	19	545	110
										17

Maximum Impacts of TAPs at Sensitive Receptors (micrograms per cubic meter).

Building/Facility	Address	X (m)	Y (m)	Maximum Impacts including Background										
				HCl	HF	1-hr	1-HR	Arsenic	Cadmium	Mercury	ann.			
Background Value				0	0	0.0000	0.0003	0	0.0002	0	0.0028			
National Ambient Air Quality Standard				75	41	0.5000	0.0200	10	0.40	1.30	0.05			
Portner House Condo.	621 N. St. Asaph	-480	-980	167	21	0.0568	0.0011	0.0071	0.0003	0.1805	0.0053			
Station Square Condo.	1423 Powhatan St.	-680	-80	280	21	0.0570	0.0007	0.0071	0.0012	0.1812	0.0051			
Blessed Sacrament Schol	1417 W. Braddock St.	-3580	720	66	5	0.0134	0.0003	0.0017	0.0003	0.0425	0.0030			
Geo. Washington Middle Sch	1005 Mt. Vernon	-1380	-380	267	20	0.0544	0.0005	0.0068	0.0007	0.1728	0.0039			
Jefferson Houston Elem. Sch	102 N. Union St.	-1280	-1380	212	16	0.0432	0.0005	0.0054	0.0008	0.1374	0.0042			
Maury School	1417 W. Braddock	-2180	-780	200	15	0.0408	0.0004	0.0051	0.0005	0.1297	0.0034			
Mount Vernon Elem. School	2600 Commonwealth	-1680	920	218	17	0.0441	0.0004	0.0056	0.0004	0.1411	0.0033			
Old Town Montessori	115 S. Washington Street	-680	-1780	213	16	0.0435	0.0005	0.0054	0.0006	0.1381	0.0037			
St. Mary's School	400 Green St.	-580	-2780	140	11	0.0284	0.0004	0.0035	0.0004	0.0904	0.0033			
St. Rita School	3801 Russell Road	-2080	2120	145	11	0.0296	0.0003	0.0037	0.0003	0.0941	0.0030			
Ladrey Senior Building	300 Wythe St.	20	-1080	226	17	0.0460	0.0009	0.0057	0.0016	0.1461	0.0063			
Woodbine Convalescent	2729 King St.	-2980	-580	144	11	0.0293	0.0003	0.0037	0.0003	0.0932	0.0030			
Alexandria Comm. Shelter	2355 Mill Road	-2380	-1980	161	12	0.0329	0.0004	0.0041	0.0004	0.1045	0.0033			
Carpenter's Shelter	930 N. Henry	-880	-580	312	24	0.0636	0.0007	0.0079	0.0012	0.2022	0.0052			
Charles Houston Recreation	901 Wythe Street	-780	-880	255	19	0.0520	0.0008	0.0065	0.0014	0.1653	0.0058			
City Hall	301 King St.	-180	-1780	215	16	0.0437	0.0006	0.0055	0.0009	0.1390	0.0044			
Nannie J. Lee Center	1108 Jefferson Street	-1280	-2480	181	14	0.0369	0.0004	0.0046	0.0004	0.1171	0.0033			
Angel Park	E. Taylor Run/W Taylor Run	-3080	-1480	161	12	0.0328	0.0004	0.0041	0.0003	0.1043	0.0031			
Chetworth Park	south of Chetworth Pl.	-580	-180	333	25	0.0678	0.0010	0.0085	0.0017	0.2155	0.0063			
Founders Park	200-400 N. Union St.	120	-1680	172	13	0.0351	0.0006	0.0044	0.0009	0.1116	0.0045			
Powhatan Park	north of Vernon St.	-680	-480	326	25	0.0663	0.0009	0.0083	0.0016	0.2108	0.0062			
Canal Way	1100 N. Pitt Street	-180	-480	278	21	0.0566	0.0013	0.0071	0.0026	0.1799	0.0084			
Chetworth Place	700-800 Chetworth Place	20	-1780	185	14	0.0377	0.0007	0.0047	0.0010	0.1198	0.0048			
Gorham Tract	700-800 Bernard St.	-480	20	312	24	0.0636	0.0008	0.0079	0.0014	0.2020	0.0058			

Maximum Impacts of TAPs at Sensitive Receptors (micrograms per cubic meter).

Building/Facility	Address	X (m)	Y (m)	Maximum Impacts including Background					
				HCL	HF	1-hr	Arsenic	Cadmium	Mercury
Background Value				0	0	0.0000	0.0003	0	0.0028
National Ambient Air Quality Standard	75	41	0	0.5000	0.0200	10	0.40	1.30	0.05
Michigan Avenue	1300 Michigan	-380	-280	318	24	0.0649	0.0016	0.0081	0.0030
Old Town Gateway	900 Powhatan St.	-480	-580	296	23	0.0603	0.0012	0.0075	0.0022
Pitt Street Station	1200 N. Pitt St.	-80	-380	251	19	0.0511	0.0017	0.0064	0.0034
Portner's Landing	600 N. Pitt St.	-280	-1080	210	16	0.0429	0.0007	0.0054	0.0012
Rivergate Place	100 Madison Pl.	120	-980	171	13	0.0348	0.0008	0.0043	0.0012
Tobacco Quay	500 N. Fairfax	-80	-1380	206	16	0.0419	0.0008	0.0052	0.0013
Virginia Village	north of Second St.	-480	-380	306	23	0.0623	0.0013	0.0078	0.0024
Westover	1000-1200 Colonial	-380	-780	289	22	0.0589	0.0009	0.0073	0.0015
Yates Garden	800 S. Lee Street	-180	-2580	148	11	0.0301	0.0005	0.0038	0.0006
Shad Row Condo	600 Pendleton St.	-480	-1080	265	20	0.0540	0.0007	0.0067	0.0011
Caylor Gardens	1701 Commonwealth	-1880	220	256	20	0.0522	0.0004	0.0065	0.0005
Giant Food Store	500 First Street	-280	-580	298	23	0.0607	0.0011	0.0076	0.0021
Masonic Temple	101 Callahan Dr.	-2080	-2480	162	12	0.0330	0.0004	0.0041	0.0004
National Media Center	815 Slaters Lane	-680	420	300	23	0.0611	0.0006	0.0076	0.0016
Salvation Army HQ	615 Slater's Lane	-280	120	267	20	0.0545	0.0009	0.0068	0.0016
St. Anthony's Day Care	319 First St.	20	-580	238	18	0.0485	0.0012	0.0060	0.0023
YMCA	420 E. Monroe	-1380	120	302	23	0.0616	0.0005	0.0077	0.0006
U.S. & Associates, Inc.	Arlandria Health Center for W3801 Exec. Avenue	-2080	2120	145	11	0.0296	0.0003	0.0037	0.0016
	517 N. St. Asaph	-380	-1180	221	17	0.0450	0.0006	0.0056	0.0010
Family Care Medical Center	C4810 Bearegard Street	-7380	620	13	1	0.0027	0.0003	0.0003	0.0002
Queen Street Clinic	1000 Queen Street	-880	-1380	247	19	0.0504	0.0003	0.0063	0.0002
Jefferson Memorial Hospital	4600 King Street	-5580	2420	13	1	0.0027	0.0006	0.0003	0.0008
St. Martin de Porres Senior C	4650 Taney Avenue	-6280	-180	24	2	0.0049	0.0003	0.0006	0.0002
Goodwin House	4800 Fillmore	-6280	1920	14	1	0.0028	0.0003	0.0004	0.0002

Maximum Estimated Impacts of Toxic Air Pollutants that are Present in Highest Quantities.

Toxic Air Pollutant	Emiss. Factor Source Table in Section 1.1 of US EPA's AP-42, or other source.	Listed as EPA HAP(b)?	Emission Rate, sum for all blrs, grams per second.	MW	VADEQ Standard or IRIS Standard (shown in ACGIH ^(c) Standard				Maximum Estimated Impacts				Impact vs. Standard
					Ceiling	STEL	TWA	1-hour	annual	1-hour	annual	1-hour	annual
micrograms per cubic meter													
hydrogen chloride	HCl and HF/T.1	yes	31.298	36.47	2983			74.6	ns	386.00	ns	5.18	ns
arsenic	Trace Metals/T.18	yes	0.011	74.92			10	0.5	0.02	0.1300	0.0100	0.26	0.50
mercury	MA study (see text)	yes	0.034	200.59			25	1.3	0.05	0.4300	0.0340	0.34	0.68
cadmium	Trace Metals/T.18	yes	0.001	112.4			2	0.1	0.004	0.0170	0.0013	0.17	0.33
hydrogen fluoride	HCl and HF/T.1	yes	3.912	20.01	1637			40.9	ns	50.0000	ns	1.22	ns
methyl hydrazine	Organics/T.14	yes	0.005	46.07			19	0.9	0.04	0.0590	0.0048	0.06	0.13
lead ^(h)	Trace Metals/T.18	yes	0.011	207.2			50	2.5	0.1	0.1351	0.0110	0.05	0.11
chromium (V) ^(g)	Trace Metals/T.18	yes	0.002	varies			10	0.5	0.02	0.0254	0.0021	0.05	0.10
selenium	Trace Metals/T.18	yes	0.034	78.96			200	10.0	0.4	0.4182	0.0339	0.04	0.08
cobalt	Trace Metals/T.19	yes	0.003	58.93			20	1.0	0.04	0.0322	0.0026	0.03	0.07
nickel	Trace Metals/T.21	yes	0.007	58.71			1500	75.0	3	0.0901	0.0073	0.00	0.00
manganese	Trace Metals/T.22	yes	0.013	54.94			200	10.0	0.4	0.1576	0.0128	0.02	0.03
beryllium	Trace Metals/T.23	yes	0.001	9.01			10	2	0.004	0.0068	0.0005	0.03	0.14
chromium	Trace Metals/T.24	yes (7)	0.007	varies			500	25.0	1	0.0836	0.0068	0.00	0.01
acrolein	Trace Metals/T.25	yes	0.008	56.06	229			5.7	0.02	0.1006	0.0082	0.02	0.41
formaldehyde	Trace Metals/T.26	yes	0.007	30.03	368			9.2	ns	0.0832	0.0067	0.01	ns

Notes:

- a) Mercury emission rate shown for the highest bituminous rate for ESP-controlled PC boilers in Massachusetts study.
- b) "The Original List of Hazardous Air Pollutants as Follows," Technology Transfer Website, Air Toxics Website, (www.epa.gov/ttn/atw/orig189.html)
- c) Threshold Limit Values for ceiling, short-term exposure limit and time-weighted averages from ACGIH's "2001 TLVs and BEIs."
- d) TLV in micrograms/cu.m. = $(\text{TLV ppm} \times \text{MW, g/mole}) / 24.45 \times 1000$.
- e) 9VAC5-60-230 states that for pollutants with a TLV-C (ceiling value), that one-hour concentrations exceeding 1/40 of the TLV-C are significant; for pollutants with both a TLV-STEL and TLV-TWA, that one-hour and annual concentrations exceeding 1/40 of the TLV-STEL and 1/500 of the TLV-TWA are significant, while for pollutants with only a TLV-TWA, that one hour and annual concentrations in excess of 1% and 1/500 of the TLV-TWA, respectively, are significant.
- f) for pollutants with only a STEL or only a ceiling value, there is no explicit VADEQ guidance within 9VAC5-60-230 for annual values.
- g) listed as chromium compound.
- h) for lead, the 3-month NAAQS of 1.5 microg./cu.m. is less restrictive than the 1-hour DEQ guideline; PRGS impacts are less than the DEQ guideline.

Summary of Emission Rates for Each of the Coal and Ash Yard Processes

Source	Model ID (Source Type)	Source Description	PM10 Rates			PM2.5 Rates		
			Annual Emission Rate	Short Term Emission Rate	Long-term Emission Rate	Annual Emission Rate	Short Term Emission Rate	Long-term Emission Rate
			tons	g/s	tons	g/s	tons	g/s
Ash Handling Processes								
AREA	Truck loading - bottom ash	7.25E-05	3.54E-06	2.08E-06	2.28E-05	1.11E-06	6.55E-07	
AREA	Truck loading - flyash silo	3.23E-04	1.58E-05	9.29E-06	1.01E-04	4.96E-06	2.92E-06	
AREA	Truck loading - flyash silo	3.23E-04	1.58E-05	9.29E-06	1.01E-04	4.96E-06	2.92E-06	
POINT	Silo A Ventilation (assume bottom ash)	14.64	4.21E-01	4.21E-01	4.60	1.32E-01	1.32E-01	
POINT	Silo B Ventilation (assume fly ash)	14.64	4.21E-01	4.21E-01	4.60	1.32E-01	1.32E-01	
POINT	Silo C Ventilation (assume flyash)	14.64	4.21E-01	4.21E-01	4.60	1.32E-01	1.32E-01	
dnm	Fly Ash Emissions from Empty Trucks Returning to Site	--	--	--	--	--	--	
	Emissions from Paved Roads - Loaded and Unloaded Trucks.	4.42	2.16E-01	1.27E-01	1.10	5.39E-02	3.18E-02	
Total Ash Handling			48.34			14.91		
Coal Handling Processes								
AREA	Coal to File from Breaker	0.02	7.11E-03	6.19E-04	0.01	2.24E-03	1.94E-04	
AREA	Coal Pile Unloading with Front End Loader	0.05	3.56E-02	1.55E-03	0.02	1.12E-02	4.86E-04	
VOLUME	Rail Car Dump in Partial Enclosure into Hopper & Hopper Dump onto Belt	0.05	9.70E-03	1.56E-03	0.02	3.05E-03	4.91E-04	
inc. above	Hopper Dump onto Belt to Breaker	0.05	9.70E-03	1.56E-03	0.02	3.05E-03	4.91E-04	
dnm	Coal Crushing & Transfer in Partial Enclosure	--	--	--	--	--	--	
VOLUME	Coal Breaker in Partial Enclosure	4.90	8.75E-01	1.41E-01	1.54	2.75E-01	4.43E-02	
Total Coal Handling/Wind Erosion			5.72			1.80		
Wind Erosion Processes								
CPILE	AREA	Wind Erosion from Coal Pile	0.39	1.12E-02	1.12E-02	0.12	3.54E-03	3.54E-03
RCAR1	AREA	Erosion of Loaded Coal in Rail Cars	0.23	6.55E-03	6.54E-03	0.07	2.05E-03	2.05E-03
RCAR2	AREA	Erosion of Residue in Rail Cars	0.01	3.27E-04	3.27E-04	0.00	1.03E-04	1.03E-04
Total Ash and Coal Yard Process Emissions			54.06	84.64	54.06	16.71	26.12	16.71

Ash Handling Processes

Emissions associated with Ash Loading and Storing

Emission factor from AP-42, Section 13.2.4: Aggregate Handling and Storage Piles (1995), Equation (1) - batch or continuous drop operation

$$E = k(0.032)(U/5)^{1.3}/(M/2)^{1.4}$$

where:

- $k = 0.11$ [particles < 2.5um]
- $k = 0.35$ [particles < 10um]
- $k = 0.74$ [particles < 30um]

$U_2 = 8$ [mph, avg wind speed within the silo enclosure]

$M = 10$ Moisture % of Fly Ash

E (lb $PM_{2.5}$ per ton material handled) = 6.81E-05

E (lb PM_{10} per ton material handled) = 2.17E-04

Ash Maximum Throughput (tons/yr) = 134.318

Emissions Associated with Truck Travel

Emission factor from AP-42, Section 13.2.1, Paved Roads (12/03), Eqn. (1).

$$E = |k(sL/2)^{1.65} \times (W/3)^{1.5} - C| * (1 - P/4N)$$

where:

- $k = 0.004$ [particles < 2.5um]
- $k = 0.016$ [particles < 10um]

sL = road surface silt loading , grams per sq. meter

C = emission factor; exhaust, brake, tire wear, lb/VMT=

3.60E-04 $PM_{2.5}$

T.13.2.1-2
4.70E-04 PM_{10}

P = no. of days with 0.01 in. of precip. Per year

W = Mean Veh. weight, tons

N = No. of days in period (assume per year if use P based on year)

E (lb $PM_{2.5}$ per VMT) = 0.55

E (lb PM_{10} per VMT) = 2.21

This value is about 1.4% higher than the ash handled at the facility in the year 2004 as reported by Mirant and provided to City of Alexandria, June, 2005.

Controlled Emissions										Env Proj. S1, T.1.4 and I.5 (baghouse, moisture control and fogging system)								
Source Name	Source ID	Uncontrolled Emissions				Controlled Emissions												
		Average Process Rate (tpd)	Peak Process Rate (tph)	Total Flow Rate (CFM)	Annual Through. (tons/yr)	Uncont. 24-hr PM ₁₀ Emissions (a) (lb PM ₁₀ /hr)	Annual PM ₁₀ Emissions (b) (tpy)	Cont. 24-hr PM _{2.5} Emissions (a) (lb PM _{2.5} /hr)	Cont. Annual PM ₁₀ Emissions (b) (g/sec)									
FA01	Truck Loading at Silos (split by bottom/fly ash in summary ws)	15	26	N/A	134,318	0.006	0.015	95.00	2.82E-04	7.28E-04	8.87E-05	2.29E-04	3.56E-05	2.09E-05	1.12E-05	6.58E-06	1.12E-05	
FA02	Ventilation Emissions (baghouse release, top of silos, split into each silo in summary ws)	368	250	11700	NA	NA	NA	0.1 gr/acf	10.03	43.93	3.15	13.81	1.26E+00	3.97E-01	3.97E-01	3.97E-01	Baghouse	
dmm		Fly Ash Emissions from Empty Trucks Returning to Site	368	250	N/A	N/A	5.0	3,640	0.00	5.0	3.64	1.57	1.144	6.29E-01	1.05E-01	1.98E-01	3.29E-02	inc. on truck return.
		Mean Veh. Weight (tons)(5)	Peak Truck Trips per day	Average Miles Traveled per day	Uncont. 24-hr PM ₁₀ Emissions (a) (lb PM ₁₀ /hr)	Annual PM ₁₀ Emissions (b) (tpy)	Cont. % ⁽³⁾	Cont. 24-hr PM _{2.5} Emissions (a) (lb PM _{2.5} /hr)	Annual PM ₁₀ Emissions (b) (g/sec)	Cont. 24-hr PM _{2.5} Emissions (a) (g/sec)	Cont. Annual PM _{2.5} Emissions (b) (g/sec)	Env Proj. S1, T.1.4 and I.5 (baghouse, moisture control and fogging system)						
AREA 2		Truck Travel On Paved Roadways (mean weight reflects loaded and unloaded, travel mult by 2))	17.50	0.373	25	15	1.71	4.42	0.00	1.71	4.42	0.43	1.10	2.16E-01	1.27E-01	5.39E-02	3.18E-02	water truck not used now.
									PM10	PM2.5			TOTAL TONS	48.34	14.91			

Note:

(a) 24-hour emissions are based on maximum hourly process rate and peak emission factor.

(b) Annual emissions are based on annual average throughput and annual average emission factor.

(c) Emissions from sources that are enclosed and vented to a fabric filter are based on 0.1 grains/dscf.

(d) Emissions from roadways use silt content of 5.1%, from AP-42 Section 13.2.2-1 for Western surface coal mining, plant road

Sample of Output for MAXIFILE Option for 24-hour SO₂ Impacts for Year 2002

*	AE	RMOD (04300): PR	SHORT-TERM S	O2 IMPACTS USIN	G AERMOD	4300	FOR YEAR	2002
*	MO	DELING OPTIONS :						
*	C	ONC		ELEV FLGPOL				DRYDPL WETDPL
*		MAXI-FILE FOR	24-HR VALUES	>= A THRESHOLD	OF 3	65		
*		FOR SOURCE GR	OU P: PRGS					
*		FORMAT: (1X,I	3,1X,A8,1X,I8	.8,2(1X,F13.5),	3(1X,F7.	2),1X,F	13.5)	
*A	VE	GRP DATE	X	Y	ZELEV	ZHILL	ZFLAG	AVERAGE CONC
*								
24	PRGS	02102924	-1532.08887	-1285.57532	7.39	11.28	0	379.9801
24	PRGS	02041124	-1500	-0.00005	11.56	11.56	0	481.7617
24	PRGS	02062124	-1500	-0.00005	11.56	11.56	0	412.5649
24	PRGS	02082124	-1500	-0.00005	11.56	11.56	0	371.7767
24	PRGS	02062024	-1477.21167	-260.47232	13.41	13.41	0	417.3214
24	PRGS	02102824	-1477.21167	-260.47232	13.41	13.41	0	366.0632
24	PRGS	02061424	-1409.53894	-513.03027	13.72	13.72	0	544.4222
24	PRGS	02091024	-1409.53894	-513.03027	13.72	13.72	0	565.963
24	PRGS	02102424	-1409.53894	-513.03027	13.72	13.72	0	470.829
24	PRGS	02102824	-1409.53894	-513.03027	13.72	13.72	0	425.82
24	PRGS	02121024	-1409.53894	-513.03027	13.72	13.72	0	384.479
24	PRGS	02061424	-1299.03809	-750.00006	12.77	12.77	0	391.5928
24	PRGS	02092624	-1299.03809	-750.00006	12.77	12.77	0	403.9734
24	PRGS	02102824	-1299.03809	-750.00006	12.77	12.77	0	383.6072
24	PRGS	02102924	-1299.03809	-750.00006	12.77	12.77	0	504.9564
24	PRGS	02112524	-1299.03809	-750.00006	12.77	12.77	0	456.4081
24	PRGS	02032024	-1299.03809	749.99994	13.3	13.3	0	409.7694
24	PRGS	02101524	-1285.5752	-1532.08887	10.54	10.54	0	383.264
24	PRGS	02102224	-1285.5752	-1532.08887	10.54	10.54	0	418.1529
24	PRGS	02041124	-1250	-0.00005	12.31	12.31	0	599.7491
24	PRGS	02062124	-1250	-0.00005	12.31	12.31	0	507.0486
24	PRGS	02082124	-1250	-0.00005	12.31	12.31	0	508.9528
24	PRGS	02121724	-1250	-0.00005	12.31	12.31	0	436.1676
24	PRGS	02062024	-1231.00964	-217.06027	12.48	12.48	0	462.1273
24	PRGS	02082124	-1231.00964	-217.06027	12.48	12.48	0	408.1993
24	PRGS	02090624	-1231.00964	-217.06027	12.48	12.48	0	371.9427
24	PRGS	02092524	-1231.00964	-217.06027	12.48	12.48	0	419.2253
24	PRGS	02102824	-1231.00964	-217.06027	12.48	12.48	0	438.4073
24	PRGS	02020924	-1231.00964	217.06018	13.58	13.58	0	464.9838
24	PRGS	02041124	-1231.00964	217.06018	13.58	13.58	0	480.6152
24	PRGS	02020924	-1174.61584	427.52515	15.24	15.24	0	472.4174
24	PRGS	02090624	-1174.61584	427.52515	15.24	15.24	0	380.8808
24	PRGS	02061424	-1174.61572	-427.52521	11.7	13.72	0	696.7141
24	PRGS	02062124	-1174.61572	-427.52521	11.7	13.72	0	380.8315
24	PRGS	02091024	-1174.61572	-427.52521	11.7	13.72	0	731.4293
24	PRGS	02092524	-1174.61572	-427.52521	11.7	13.72	0	395.5626
24	PRGS	02092624	-1174.61572	-427.52521	11.7	13.72	0	410.7317
24	PRGS	02101024	-1174.61572	-427.52521	11.7	13.72	0	429.9006
24	PRGS	02102424	-1174.61572	-427.52521	11.7	13.72	0	629.7099
24	PRGS	02102824	-1174.61572	-427.52521	11.7	13.72	0	545.7938
24	PRGS	02121024	-1174.61572	-427.52521	11.7	13.72	0	513.3729
24	PRGS	02042124	-1149.06665	-964.18146	10.34	10.34	0	435.9577
24	PRGS	02101024	-1149.06665	-964.18146	10.34	10.34	0	403.0949
24	PRGS	02102824	-1149.06665	-964.18146	10.34	10.34	0	435.8837
24	PRGS	02102924	-1149.06665	-964.18146	10.34	10.34	0	642.8221

*	AE	RMOD (04300): PR	SHORT-TERM S	O2 IMPACTS USIN	G AERMOD	4300	FOR YEAR	2002
*	MO	DELING OPTIONS						
*	C	ONC		ELEV FLGPOL				DRYDPL WETDPL
*		MAXI-FILE FOR	24-HR VALUES	>= A THRESHOLD	OF 3	65		
*		FOR SOURCE GR	OUP: PRGS					
*		FORMAT: (1X,I	3,1X,A8,1X,I8	.8,2(1X,F13.5),	3(1X,F7.	2),1X,F	13.5)	
*A	VE	GRP DATE	X	Y	ZELEV	ZHILL	ZFLAG	AVERAGE CONC
*								
24	PRGS	02111624	-1149.06665	-964.18146	10.34	10.34	0	510.4983
24	PRGS	02112524	-1149.06665	-964.18146	10.34	10.34	0	413.5911
24	PRGS	02093024	-1149.06665	964.1814	10.89	13.11	0	368.4084
24	PRGS	02042124	-1082.53174	-625.00006	13.48	13.48	0	419.5414
24	PRGS	02061424	-1082.53174	-625.00006	13.48	13.48	0	536.6622
24	PRGS	02091024	-1082.53174	-625.00006	13.48	13.48	0	449.3061
24	PRGS	02092624	-1082.53174	-625.00006	13.48	13.48	0	566.3421
24	PRGS	02101024	-1082.53174	-625.00006	13.48	13.48	0	409.3986
24	PRGS	02102424	-1082.53174	-625.00006	13.48	13.48	0	393.7736
24	PRGS	02102824	-1082.53174	-625.00006	13.48	13.48	0	543.6524
24	PRGS	02102924	-1082.53174	-625.00006	13.48	13.48	0	666.6717
24	PRGS	02111624	-1082.53174	-625.00006	13.48	13.48	0	372.519
24	PRGS	02112524	-1082.53174	-625.00006	13.48	13.48	0	558.6867
24	PRGS	02121024	-1082.53174	-625.00006	13.48	13.48	0	462.7779
24	PRGS	02121724	-1082.53174	-625.00006	13.48	13.48	0	378.1926
24	PRGS	02122424	-1082.53174	-625.00006	13.48	13.48	0	400.0739
24	PRGS	02032024	-1082.53174	624.99994	13.63	15.24	0	524.3761
24	PRGS	02072524	-1082.53174	624.99994	13.63	15.24	0	399.7035
24	PRGS	02090624	-1082.53174	624.99994	13.63	15.24	0	406.9044
24	PRGS	02090724	-1082.53174	624.99994	13.63	15.24	0	375.4952
24	PRGS	02101124	-1082.53174	624.99994	13.63	15.24	0	429.5839
24	PRGS	02062024	-1000.00006	1732.05078	6.95	10.67	0	386.8756
24	PRGS	02031724	-1000	-1000	13.31	13.31	0	424.3593
24	PRGS	02042124	-1000	-1000	13.31	13.31	0	585.6612
24	PRGS	02071024	-1000	-1000	13.31	13.31	0	421.2998
24	PRGS	02071124	-1000	-1000	13.31	13.31	0	431.3776
24	PRGS	02082824	-1000	-1000	13.31	13.31	0	465.4802
24	PRGS	02083024	-1000	-1000	13.31	13.31	0	390.2777
24	PRGS	02083124	-1000	-1000	13.31	13.31	0	413.2885
24	PRGS	02092624	-1000	-1000	13.31	13.31	0	369.014
24	PRGS	02100924	-1000	-1000	13.31	13.31	0	475.3239
24	PRGS	02101024	-1000	-1000	13.31	13.31	0	380.8319
24	PRGS	02101224	-1000	-1000	13.31	13.31	0	470.0406
24	PRGS	02101424	-1000	-1000	13.31	13.31	0	397.217
24	PRGS	02101524	-1000	-1000	13.31	13.31	0	581.8
24	PRGS	02102124	-1000	-1000	13.31	13.31	0	441.4637
24	PRGS	02102224	-1000	-1000	13.31	13.31	0	453.0378
24	PRGS	02102524	-1000	-1000	13.31	13.31	0	387.2322
24	PRGS	02102924	-1000	-1000	13.31	13.31	0	611.3748
24	PRGS	02111624	-1000	-1000	13.31	13.31	0	566.9663
24	PRGS	02112524	-1000	-1000	13.31	13.31	0	495.9358
24	PRGS	02112624	-1000	-1000	13.31	13.31	0	395.9988
24	PRGS	02031724	-1000	-900	12.92	12.92	0	449.6805
24	PRGS	02042124	-1000	-900	12.92	12.92	0	599.2728
24	PRGS	02071024	-1000	-900	12.92	12.92	0	429.7649
24	PRGS	02082824	-1000	-900	12.92	12.92	0	448.2421
24	PRGS	02083124	-1000	-900	12.92	12.92	0	454.3043

*	AE	RMOD (04300): PR	SHORT-TERM S	O2 IMPACTS USIN	G AERMOD	4300	FOR YEAR	2002
*	MO	DELING OPTIONS	:					
*	C	ONC		ELEV FLGPOL				DRYDPL WETDPL
*		MAXI-FILE FOR	24-HR VALUES	>= A THRESHOLD	OF 3	65		
*		FOR SOURCE GR	OUT: PRGS					
*		FORMAT: (1X,I	3,1X,A8,1X,I8	.8,2(1X,F13.5),	3(1X,F7.	2),1X,F	13.5)	
*A	VE	GRP DATE	X	Y	ZELEV	ZHILL	ZFLAG	AVERAGE CONC
*								
24	PRGS	02092624	-1000	-900	12.92	12.92	0	422.1136
24	PRGS	02100924	-1000	-900	12.92	12.92	0	365.6381
24	PRGS	02101024	-1000	-900	12.92	12.92	0	448.6666
24	PRGS	02101224	-1000	-900	12.92	12.92	0	412.3617
24	PRGS	02101424	-1000	-900	12.92	12.92	0	398.3071
24	PRGS	02101524	-1000	-900	12.92	12.92	0	439.4251
24	PRGS	02102124	-1000	-900	12.92	12.92	0	380.4009
24	PRGS	02102524	-1000	-900	12.92	12.92	0	374.8707
24	PRGS	02102824	-1000	-900	12.92	12.92	0	482.7422
24	PRGS	02102924	-1000	-900	12.92	12.92	0	717.7278
24	PRGS	02111624	-1000	-900	12.92	12.92	0	606.309
24	PRGS	02112524	-1000	-900	12.92	12.92	0	495.2492
24	PRGS	02031724	-1000	-800	13.21	13.21	0	411.782
24	PRGS	02042124	-1000	-800	13.21	13.21	0	526.2929
24	PRGS	02071024	-1000	-800	13.21	13.21	0	385.6912
24	PRGS	02082824	-1000	-800	13.21	13.21	0	385.1583
24	PRGS	02083124	-1000	-800	13.21	13.21	0	443.5407
24	PRGS	02092624	-1000	-800	13.21	13.21	0	498.9348
24	PRGS	02101024	-1000	-800	13.21	13.21	0	480.1545
24	PRGS	02102824	-1000	-800	13.21	13.21	0	587.4218
24	PRGS	02102924	-1000	-800	13.21	13.21	0	821.3541
24	PRGS	02111624	-1000	-800	13.21	13.21	0	629.9509
24	PRGS	02112524	-1000	-800	13.21	13.21	0	503.9913
24	PRGS	02121024	-1000	-800	13.21	13.21	0	411.9063
24	PRGS	02042124	-1000	-700	14.45	14.45	0	469.0196
24	PRGS	02083124	-1000	-700	14.45	14.45	0	398.6244
24	PRGS	02092624	-1000	-700	14.45	14.45	0	559.1356
24	PRGS	02101024	-1000	-700	14.45	14.45	0	490.6065
24	PRGS	02102524	-1000	-700	14.45	14.45	0	365.2111
24	PRGS	02102824	-1000	-700	14.45	14.45	0	613.5443
24	PRGS	02102924	-1000	-700	14.45	14.45	0	811.812
24	PRGS	02111624	-1000	-700	14.45	14.45	0	584.069
24	PRGS	02112524	-1000	-700	14.45	14.45	0	535.7556
24	PRGS	02121024	-1000	-700	14.45	14.45	0	446.7875
24	PRGS	02121724	-1000	-700	14.45	14.45	0	492.8713
24	PRGS	02122424	-1000	-700	14.45	14.45	0	387.2867
24	PRGS	02042124	-1000	-600	13.56	13.56	0	469.7779
24	PRGS	02061424	-1000	-600	13.56	13.56	0	545.9895
24	PRGS	02083124	-1000	-600	13.56	13.56	0	385.3558
24	PRGS	02091024	-1000	-600	13.56	13.56	0	465.674
24	PRGS	02092524	-1000	-600	13.56	13.56	0	394.0931
24	PRGS	02092624	-1000	-600	13.56	13.56	0	635.8348
24	PRGS	02101024	-1000	-600	13.56	13.56	0	457.8079
24	PRGS	02102424	-1000	-600	13.56	13.56	0	416.4447
24	PRGS	02102524	-1000	-600	13.56	13.56	0	386.9469
24	PRGS	02102824	-1000	-600	13.56	13.56	0	617.6245

*	AE	RMOD (04300): PR	SHORT-TERM S	O2 IMPACTS USIN	G AERMOD	4300	FOR YEAR	2002
*	MO	DELING OPTIONS	:					
*	C	ONC		ELEV FLGPOL				DRYDPL WETDPL
*		MAXI-FILE FOR	24-HR VALUES	>= A THRESHOLD	OF 3	65		
*		FOR SOURCE GR	OUP: PRGS					
*		FORMAT: (1X,I	3,1X,A8,1X,I8	.8,2(1X,F13.5),	3(1X,F7.	2),1X,F	13.5)	
*	A	VE	GRP DATE	X	Y	ZELEV	ZHILL	ZFLAG
*								AVERAGE CONC
24	PRGS	02102924	-1000	-600	13.56	13.56	0	760.6162
24	PRGS	02111624	-1000	-600	13.56	13.56	0	446.3384
24	PRGS	02112524	-1000	-600	13.56	13.56	0	592.6044
24	PRGS	02121024	-1000	-600	13.56	13.56	0	502.5007
24	PRGS	02121724	-1000	-600	13.56	13.56	0	442.8208
24	PRGS	02122424	-1000	-600	13.56	13.56	0	438.8579
24	PRGS	02042124	-1000	-500	12.57	14.02	0	507.0863
24	PRGS	02061424	-1000	-500	12.57	14.02	0	824.8826
24	PRGS	02083124	-1000	-500	12.57	14.02	0	374.9918
24	PRGS	02091024	-1000	-500	12.57	14.02	0	753.3933
24	PRGS	02092524	-1000	-500	12.57	14.02	0	444.1775
24	PRGS	02092624	-1000	-500	12.57	14.02	0	647.8044
24	PRGS	02101024	-1000	-500	12.57	14.02	0	456.8021
24	PRGS	02102424	-1000	-500	12.57	14.02	0	605.522
24	PRGS	02102524	-1000	-500	12.57	14.02	0	378.0339
24	PRGS	02102824	-1000	-500	12.57	14.02	0	634.8154
24	PRGS	02102924	-1000	-500	12.57	14.02	0	602.4872
24	PRGS	02111214	-1000	-500	12.57	14.02	0	400.2597
24	PRGS	02112524	-1000	-500	12.57	14.02	0	516.5499
24	PRGS	02121024	-1000	-500	12.57	14.02	0	592.9081
24	PRGS	02122424	-1000	-500	12.57	14.02	0	433.682
24	PRGS	02020724	-1000	-400	12.12	12.12	0	385.3344
24	PRGS	02042124	-1000	-400	12.12	12.12	0	478.37
24	PRGS	02042824	-1000	-400	12.12	12.12	0	410.4802
24	PRGS	02061424	-1000	-400	12.12	12.12	0	877.2329
24	PRGS	02062124	-1000	-400	12.12	12.12	0	418.2907
24	PRGS	02072524	-1000	-400	12.12	12.12	0	393.6618
24	PRGS	02091024	-1000	-400	12.12	12.12	0	901.3579
24	PRGS	02092524	-1000	-400	12.12	12.12	0	497.529
24	PRGS	02092624	-1000	-400	12.12	12.12	0	592.4523
24	PRGS	02100924	-1000	-400	12.12	12.12	0	375.4961
24	PRGS	02101024	-1000	-400	12.12	12.12	0	492.808
24	PRGS	02101524	-1000	-400	12.12	12.12	0	390.191
24	PRGS	02102424	-1000	-400	12.12	12.12	0	764.3703
24	PRGS	02102824	-1000	-400	12.12	12.12	0	657.1301
24	PRGS	02102924	-1000	-400	12.12	12.12	0	402.2833
24	PRGS	02112124	-1000	-400	12.12	12.12	0	454.627
24	PRGS	02121024	-1000	-400	12.12	12.12	0	623.1507
24	PRGS	02122424	-1000	-400	12.12	12.12	0	369.4206
24	PRGS	02042124	-1000	-300	11.23	11.23	0	393.9533
24	PRGS	02061424	-1000	-300	11.23	11.23	0	685.3684
24	PRGS	02062024	-1000	-300	11.23	11.23	0	483.0162
24	PRGS	02072524	-1000	-300	11.23	11.23	0	489.2308
24	PRGS	02091024	-1000	-300	11.23	11.23	0	702.7252
24	PRGS	02092524	-1000	-300	11.23	11.23	0	579.0519
24	PRGS	02092624	-1000	-300	11.23	11.23	0	395.5028
24	PRGS	02101024	-1000	-300	11.23	11.23	0	393.4464

*	AE	RMOD (04300): PR	SHORT-TERM S	O2 IMPACTS USIN	G AERMOD	4300	FOR YEAR	2002
*	MO	DELING OPTIONS						
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*		MAXI-FILE FOR	24-HR VALUES	>= A THRESHOLD	OF 3	65		
*		FOR SOURCE GR	OUT: PRGS					
*		FORMAT: (1X,I	3,1X,A8,1X,I8	.8,2(1X,F13.5),	3(1X,F7.	2),1X,F	13.5)	
*A	VE	GRP DATE	X	Y	ZELEV	ZHILL	ZFLAG	AVERAGE CONC
*								
24	PRGS	02102424	-1000	-300	11.23	11.23	0	707.0449
24	PRGS	02102824	-1000	-300	11.23	11.23	0	641.5294
24	PRGS	02121024	-1000	-300	11.23	11.23	0	541.4143
24	PRGS	02041124	-1000	-200	13.25	13.25	0	425.348
24	PRGS	02061424	-1000	-200	13.25	13.25	0	389.8645
24	PRGS	02062024	-1000	-200	13.25	13.25	0	538.9199
24	PRGS	02072524	-1000	-200	13.25	13.25	0	496.8312
24	PRGS	02082124	-1000	-200	13.25	13.25	0	507.8367
24	PRGS	02083124	-1000	-200	13.25	13.25	0	371.559
24	PRGS	02090624	-1000	-200	13.25	13.25	0	442.3167
24	PRGS	02092524	-1000	-200	13.25	13.25	0	577.6729
24	PRGS	02102424	-1000	-200	13.25	13.25	0	436.0863
24	PRGS	02102824	-1000	-200	13.25	13.25	0	561.7302
24	PRGS	02041124	-1000	-100	15.74	15.74	0	636.8442
24	PRGS	02072524	-1000	-100	15.74	15.74	0	413.0423
24	PRGS	02082124	-1000	-100	15.74	15.74	0	721.6154
24	PRGS	02083124	-1000	-100	15.74	15.74	0	375.3871
24	PRGS	02090624	-1000	-100	15.74	15.74	0	389.6988
24	PRGS	02092524	-1000	-100	15.74	15.74	0	440.0953
24	PRGS	02102824	-1000	-100	15.74	15.74	0	430.3232
24	PRGS	02121724	-1000	-100	15.74	15.74	0	480.1157
24	PRGS	02041124	-1000	0	13.89	18.59	0	755.147
24	PRGS	02062124	-1000	0	13.89	18.59	0	607.8691
24	PRGS	02082124	-1000	0	13.89	18.59	0	655.8322
24	PRGS	02121724	-1000	0	13.89	18.59	0	528.4529
24	PRGS	02020924	-1000	100	13.76	14.94	0	386.6011
24	PRGS	02041124	-1000	100	13.76	14.94	0	658.867
24	PRGS	02062124	-1000	100	13.76	14.94	0	605.7977
24	PRGS	02072624	-1000	100	13.76	14.94	0	480.5083
24	PRGS	02082124	-1000	100	13.76	14.94	0	382.8117
24	PRGS	02020924	-1000	200	13.07	14.94	0	648.7506
24	PRGS	02041124	-1000	200	13.07	14.94	0	647.7719
24	PRGS	02041224	-1000	200	13.07	14.94	0	386.7034
24	PRGS	02072624	-1000	200	13.07	14.94	0	408.5983
24	PRGS	02020924	-1000	300	12.63	13.72	0	657.2836
24	PRGS	02041124	-1000	300	12.63	13.72	0	565.0129
24	PRGS	02041224	-1000	300	12.63	13.72	0	503.1623
24	PRGS	02020924	-1000	400	12.59	13.72	0	511.1354
24	PRGS	02050824	-1000	400	12.59	13.72	0	378.0499
24	PRGS	02090624	-1000	400	12.59	13.72	0	517.6393
24	PRGS	02032024	-1000	500	13.36	13.36	0	477.4301
24	PRGS	02050824	-1000	500	13.36	13.36	0	417.9612
24	PRGS	02072524	-1000	500	13.36	13.36	0	416.3407
24	PRGS	02090624	-1000	500	13.36	13.36	0	541.3557
24	PRGS	02090724	-1000	500	13.36	13.36	0	431.6654
24	PRGS	02032024	-1000	600	14.07	14.07	0	575.8441
24	PRGS	02050824	-1000	600	14.07	14.07	0	373.8741

*	AE	RMOD (04300): PR	SHORT-TERM S	O2 IMPACTS USIN	G AERMOD	4300	FOR YEAR	2002
*	MO	DELING OPTIONS	:					
*	C	ONC		ELEV FLGPOL				DRYDPL WETDPL
*		MAXI-FILE FOR	24-HR VALUES	>= A THRESHOLD	OF 3	65		
*		FOR SOURCE GR	OUT: PRGS					
*		FORMAT: (1X,I	3,1X,A8,1X,I8	.8.2(1X,F13.5),	3(1X,F7.	2),1X,F	13.5)	
*A	VE	GRP DATE	X	Y	ZELEV	ZHILL	ZFLAG	AVERAGE CONC
*								
24	PRGS	02072524	-1000	600	14.07	14.07	0	464.8768
24	PRGS	02090624	-1000	600	14.07	14.07	0	400.1983
24	PRGS	02090724	-1000	600	14.07	14.07	0	375.5234
24	PRGS	02101124	-1000	600	14.07	14.07	0	476.8089
24	PRGS	02032024	-1000	700	13.09	14.94	0	490.6332
24	PRGS	02072524	-1000	700	13.09	14.94	0	472.9525
24	PRGS	02100824	-1000	700	13.09	14.94	0	431.6376
24	PRGS	02101124	-1000	700	13.09	14.94	0	444.5623
24	PRGS	02072524	-1000	800	13.19	15.24	0	434.7414
24	PRGS	02093024	-1000	800	13.19	15.24	0	420.6417
24	PRGS	02100824	-1000	800	13.19	15.24	0	404.4475
24	PRGS	02093024	-1000	900	13.33	14.02	0	427.9136
24	PRGS	02031224	-1000	1000	13.11	13.11	0	407.2279
24	PRGS	02093024	-1000	1000	13.11	13.11	0	372.1049
24	PRGS	02042124	-980	-580	13.36	13.36	1.8	485.5163
24	PRGS	02042124	-980	-580	13.36	13.36	4.8	484.9135
24	PRGS	02042124	-980	-580	13.36	13.36	7.9	484.4077
24	PRGS	02061424	-980	-580	13.36	13.36	1.8	579.2206
24	PRGS	02061424	-980	-580	13.36	13.36	4.8	579.708
24	PRGS	02061424	-980	-580	13.36	13.36	7.9	580.6491
24	PRGS	02083124	-980	-580	13.36	13.36	1.8	395.0332
24	PRGS	02083124	-980	-580	13.36	13.36	4.8	394.0458
24	PRGS	02083124	-980	-580	13.36	13.36	7.9	393.3315
24	PRGS	02091024	-980	-580	13.36	13.36	1.8	503.0149
24	PRGS	02091024	-980	-580	13.36	13.36	4.8	502.9531
24	PRGS	02091024	-980	-580	13.36	13.36	7.9	502.9911
24	PRGS	02092524	-980	-580	13.36	13.36	1.8	408.219
24	PRGS	02092524	-980	-580	13.36	13.36	4.8	407.6598
24	PRGS	02092524	-980	-580	13.36	13.36	7.9	407.2149
24	PRGS	02092624	-980	-580	13.36	13.36	1.8	658.2893
24	PRGS	02092624	-980	-580	13.36	13.36	4.8	657.9704
24	PRGS	02092624	-980	-580	13.36	13.36	7.9	657.6353
24	PRGS	02101024	-980	-580	13.36	13.36	1.8	465.0875
24	PRGS	02101024	-980	-580	13.36	13.36	4.8	465.1455
24	PRGS	02101024	-980	-580	13.36	13.36	7.9	465.4343
24	PRGS	02102424	-980	-580	13.36	13.36	1.8	439.4624
24	PRGS	02102424	-980	-580	13.36	13.36	4.8	439.3178
24	PRGS	02102424	-980	-580	13.36	13.36	7.9	439.4205
24	PRGS	02102524	-980	-580	13.36	13.36	1.8	399.1773
24	PRGS	02102524	-980	-580	13.36	13.36	4.8	399.2052
24	PRGS	02102524	-980	-580	13.36	13.36	7.9	399.4164
24	PRGS	02102824	-980	-580	13.36	13.36	1.8	635.8283
24	PRGS	02102824	-980	-580	13.36	13.36	4.8	636.2784
24	PRGS	02102824	-980	-580	13.36	13.36	7.9	637.2145
24	PRGS	02102924	-980	-580	13.36	13.36	1.8	771.1709
24	PRGS	02102924	-980	-580	13.36	13.36	4.8	769.9609
24	PRGS	02102924	-980	-580	13.36	13.36	7.9	768.655

*	AE	RMOD (04300): PR	SHORT-TERM S	O2 IMPACTS USIN	G AERMOD	4300	FOR YEAR	2002
*	MO	DELING OPTIONS						
*	C	ONC		ELEV FLGPOL				DRYDPL WETDPL
*		MAXI-FILE FOR	24-HR VALUES	>= A THRESHOLD	OF 3	65		
*		FOR SOURCE GR	OUT: PRGS					
*		FORMAT: (1X,I	3,1X,A8,1X,I8	.8,2(1X,F13.5),	3(1X,F7.	2),1X,F	13.5)	
*A	VE	GRP DATE	X	Y	ZELEV	ZHILL	ZFLAG	AVERAGE CONC
*								
24	PRGS	02111624	-980	-580	13.36	13.36	1.8	438.9284
24	PRGS	02111624	-980	-580	13.36	13.36	4.8	438.5708
24	PRGS	02111624	-980	-580	13.36	13.36	7.9	438.4814
24	PRGS	02112524	-980	-580	13.36	13.36	1.8	604.6406
24	PRGS	02112524	-980	-580	13.36	13.36	4.8	604.7242
24	PRGS	02112524	-980	-580	13.36	13.36	7.9	604.8696
24	PRGS	02121024	-980	-580	13.36	13.36	1.8	522.2647
24	PRGS	02121024	-980	-580	13.36	13.36	4.8	522.6578
24	PRGS	02121024	-980	-580	13.36	13.36	7.9	523.4548
24	PRGS	02121724	-980	-580	13.36	13.36	1.8	437.5808
24	PRGS	02121724	-980	-580	13.36	13.36	4.8	437.569
24	PRGS	02121724	-980	-580	13.36	13.36	7.9	437.6369
24	PRGS	02122424	-980	-580	13.36	13.36	1.8	452.5808
24	PRGS	02122424	-980	-580	13.36	13.36	4.8	452.5706
24	PRGS	02122424	-980	-580	13.36	13.36	7.9	452.7019
24	PRGS	02020924	-964.18146	1149.06665	11.06	13.41	0	382.325
24	PRGS	02031224	-964.18146	1149.06665	11.06	13.41	0	380.4096
24	PRGS	02052924	-964.18146	1149.06665	11.06	13.41	0	388.6423
24	PRGS	02032424	-964.1814	-1149.06665	11.93	11.93	0	487.1561
24	PRGS	02042124	-964.1814	-1149.06665	11.93	11.93	0	371.8284
24	PRGS	02071124	-964.1814	-1149.06665	11.93	11.93	0	465.6293
24	PRGS	02082824	-964.1814	-1149.06665	11.93	11.93	0	390.4383
24	PRGS	02092924	-964.1814	-1149.06665	11.93	11.93	0	549.5645
24	PRGS	02100924	-964.1814	-1149.06665	11.93	11.93	0	400.8842
24	PRGS	02101224	-964.1814	-1149.06665	11.93	11.93	0	559.7238
24	PRGS	02101524	-964.1814	-1149.06665	11.93	11.93	0	609.0777
24	PRGS	02102124	-964.1814	-1149.06665	11.93	11.93	0	387.9015
24	PRGS	02102224	-964.1814	-1149.06665	11.93	11.93	0	559.8716
24	PRGS	02102524	-964.1814	-1149.06665	11.93	11.93	0	422.9122
24	PRGS	02102924	-964.1814	-1149.06665	11.93	11.93	0	419.8444
24	PRGS	02111624	-964.1814	-1149.06665	11.93	11.93	0	516.7189
24	PRGS	02112524	-964.1814	-1149.06665	11.93	11.93	0	417.6489
24	PRGS	02072524	-957.5556	803.4845	12.81	12.81	0	436.5208
24	PRGS	02091824	-957.5556	803.4845	12.81	12.81	0	392.8938
24	PRGS	02093024	-957.5556	803.4845	12.81	12.81	0	457.7019
24	PRGS	02031724	-957.55554	-803.48456	13.93	13.93	0	466.4151
24	PRGS	02042124	-957.55554	-803.48456	13.93	13.93	0	595.4617
24	PRGS	02071024	-957.55554	-803.48456	13.93	13.93	0	429.1393
24	PRGS	02082824	-957.55554	-803.48456	13.93	13.93	0	437.9704
24	PRGS	02083124	-957.55554	-803.48456	13.93	13.93	0	482.9857
24	PRGS	02092624	-957.55554	-803.48456	13.93	13.93	0	505.9348
24	PRGS	02101024	-957.55554	-803.48456	13.93	13.93	0	490.4383
24	PRGS	02101224	-957.55554	-803.48456	13.93	13.93	0	394.0768
24	PRGS	02101524	-957.55554	-803.48456	13.93	13.93	0	370.4149
24	PRGS	02102524	-957.55554	-803.48456	13.93	13.93	0	389.2537
24	PRGS	02102824	-957.55554	-803.48456	13.93	13.93	0	585.1277
24	PRGS	02102924	-957.55554	-803.48456	13.93	13.93	0	838.9742

*	AE	RMOD (04300): PR	SHORT-TERM S	O2 IMPACTS USIN	G AERMOD	4300	FOR YEAR	2002
*	MO	DELING OPTIONS	:					
*	C	ONC		ELEV FLGPOL				DRYDPL WETDPL
*		MAXI-FILE FOR	24-HR VALUES	>= A THRESHOLD	OF 3	65		
*		FOR SOURCE GR	OUT: PRGS					
*		FORMAT: (1X,I	3,1X,A8,1X,I8	.8,2(1X,F13.5),	3(1X,F7.	2),1X,F	13.5)	
*A	VE	GRP DATE	X	Y	ZELEV	ZHILL	ZFLAG	AVERAGE CONC
*								
24	PRGS	02111624	-957.55554	-803.48456	13.93	13.93	0	667.4587
24	PRGS	02112524	-957.55554	-803.48456	13.93	13.93	0	531.1155
24	PRGS	02121024	-957.55554	-803.48456	13.93	13.93	0	410.8164
24	PRGS	02031724	-900	-1000	13.85	13.85	0	414.9356
24	PRGS	02032424	-900	-1000	13.85	13.85	0	482.1255
24	PRGS	02042124	-900	-1000	13.85	13.85	0	565.0958
24	PRGS	02071024	-900	-1000	13.85	13.85	0	413.5438
24	PRGS	02071124	-900	-1000	13.85	13.85	0	545.9996
24	PRGS	02082824	-900	-1000	13.85	13.85	0	498.8741
24	PRGS	02083024	-900	-1000	13.85	13.85	0	401.1902
24	PRGS	02083124	-900	-1000	13.85	13.85	0	377.1775
24	PRGS	02090624	-900	-1000	13.85	13.85	0	383.2097
24	PRGS	02092624	-900	-1000	13.85	13.85	0	401.8083
24	PRGS	02092724	-900	-1000	13.85	13.85	0	370.9838
24	PRGS	02092924	-900	-1000	13.85	13.85	0	520.8742
24	PRGS	02100924	-900	-1000	13.85	13.85	0	512.4298
24	PRGS	02101224	-900	-1000	13.85	13.85	0	623.8161
24	PRGS	02101524	-900	-1000	13.85	13.85	0	718.0017
24	PRGS	02102124	-900	-1000	13.85	13.85	0	483.752
24	PRGS	02102224	-900	-1000	13.85	13.85	0	594.8815
24	PRGS	02102524	-900	-1000	13.85	13.85	0	478.7855
24	PRGS	02102924	-900	-1000	13.85	13.85	0	561.89
24	PRGS	02111624	-900	-1000	13.85	13.85	0	637.4752
24	PRGS	02112524	-900	-1000	13.85	13.85	0	507.573
24	PRGS	02112624	-900	-1000	13.85	13.85	0	434.9221
24	PRGS	02122924	-900	-1000	13.85	13.85	0	367.0972
24	PRGS	02031724	-900	-900	14.01	14.01	0	504.5145
24	PRGS	02042124	-900	-900	14.01	14.01	0	677.2048
24	PRGS	02071024	-900	-900	14.01	14.01	0	494.8909
24	PRGS	02071124	-900	-900	14.01	14.01	0	503.1234
24	PRGS	02082824	-900	-900	14.01	14.01	0	551.4121
24	PRGS	02083024	-900	-900	14.01	14.01	0	424.3865
24	PRGS	02083124	-900	-900	14.01	14.01	0	486.0226
24	PRGS	02090624	-900	-900	14.01	14.01	0	402.7647
24	PRGS	02092624	-900	-900	14.01	14.01	0	444.578
24	PRGS	02092924	-900	-900	14.01	14.01	0	407.9671
24	PRGS	02100924	-900	-900	14.01	14.01	0	508.1413
24	PRGS	02101024	-900	-900	14.01	14.01	0	414.6285
24	PRGS	02101224	-900	-900	14.01	14.01	0	564.3584
24	PRGS	02101424	-900	-900	14.01	14.01	0	449.2847
24	PRGS	02101524	-900	-900	14.01	14.01	0	647.9706
24	PRGS	02102124	-900	-900	14.01	14.01	0	499.2496
24	PRGS	02102224	-900	-900	14.01	14.01	0	495.8937
24	PRGS	02102524	-900	-900	14.01	14.01	0	459.366
24	PRGS	02102824	-900	-900	14.01	14.01	0	422.0517
24	PRGS	02102924	-900	-900	14.01	14.01	0	708.9183
24	PRGS	02111624	-900	-900	14.01	14.01	0	675.1895

*	AE	RMOD (04300): PR	SHORT-TERM S	O2 IMPACTS USIN	G AERMOD	4300	FOR YEAR	2002
*	MO	DELING OPTIONS						
*	C	ONC		ELEV FLGPOL				DRYDPL WETDPL
*		MAXI-FILE FOR	24-HR VALUES	>= A THRESHOLD	OF 3	65		
*		FOR SOURCE GR	OUP: PRGS					
*		FORMAT: (1X,I	3,1X,A8,1X,I8	.8,2(1X,F13.5),	3(1X,F7.	2),1X,F	13.5)	
*A	VE	GRP DATE	X	Y	ZELEV	ZHILL	ZFLAG	AVERAGE CONC
*								
24	PRGS	02112524	-900	-900	14.01	14.01	0	556.4681
24	PRGS	02112624	-900	-900	14.01	14.01	0	426.9832
24	PRGS	02013124	-900	-800	14.05	14.05	0	398.7237
24	PRGS	02031724	-900	-800	14.05	14.05	0	526.3361
24	PRGS	02042124	-900	-800	14.05	14.05	0	685.2993
24	PRGS	02071024	-900	-800	14.05	14.05	0	510.1824
24	PRGS	02071124	-900	-800	14.05	14.05	0	376.558
24	PRGS	02082824	-900	-800	14.05	14.05	0	519.811
24	PRGS	02083124	-900	-800	14.05	14.05	0	530.5825
24	PRGS	02092624	-900	-800	14.05	14.05	0	519.0178
24	PRGS	02100924	-900	-800	14.05	14.05	0	378.9471
24	PRGS	02101024	-900	-800	14.05	14.05	0	496.6453
24	PRGS	02101224	-900	-800	14.05	14.05	0	479.5403
24	PRGS	02101424	-900	-800	14.05	14.05	0	425.2611
24	PRGS	02101524	-900	-800	14.05	14.05	0	486.6551
24	PRGS	02102124	-900	-800	14.05	14.05	0	430.448
24	PRGS	02102424	-900	-800	14.05	14.05	0	377.9652
24	PRGS	02102524	-900	-800	14.05	14.05	0	440.1181
24	PRGS	02102824	-900	-800	14.05	14.05	0	582.184
24	PRGS	02102924	-900	-800	14.05	14.05	0	856.4565
24	PRGS	02111624	-900	-800	14.05	14.05	0	710.6712
24	PRGS	02112524	-900	-800	14.05	14.05	0	573.012
24	PRGS	02121024	-900	-800	14.05	14.05	0	417.7745
24	PRGS	02013124	-900	-700	14.93	14.93	0	394.476
24	PRGS	02031724	-900	-700	14.93	14.93	0	447.5767
24	PRGS	02031824	-900	-700	14.93	14.93	0	387.3431
24	PRGS	02042124	-900	-700	14.93	14.93	0	600.6997
24	PRGS	02071024	-900	-700	14.93	14.93	0	435.2017
24	PRGS	02082824	-900	-700	14.93	14.93	0	431.2301
24	PRGS	02083124	-900	-700	14.93	14.93	0	492.1758
24	PRGS	02092524	-900	-700	14.93	14.93	0	388.4068
24	PRGS	02092624	-900	-700	14.93	14.93	0	607.7473
24	PRGS	02101024	-900	-700	14.93	14.93	0	535.5302
24	PRGS	02101224	-900	-700	14.93	14.93	0	369.7335
24	PRGS	02102424	-900	-700	14.93	14.93	0	391.9295
24	PRGS	02102524	-900	-700	14.93	14.93	0	413.4109
24	PRGS	02102824	-900	-700	14.93	14.93	0	691.562
24	PRGS	02102924	-900	-700	14.93	14.93	0	960.0949
24	PRGS	02111624	-900	-700	14.93	14.93	0	693.6585
24	PRGS	02112524	-900	-700	14.93	14.93	0	573.9803
24	PRGS	02121024	-900	-700	14.93	14.93	0	493.4531
24	PRGS	02121724	-900	-700	14.93	14.93	0	454.5621
24	PRGS	02122424	-900	-700	14.93	14.93	0	388.5035
24	PRGS	02031824	-900	-600	14.2	14.2	0	365.2003
24	PRGS	02042124	-900	-600	14.2	14.2	0	551.7413
24	PRGS	02061424	-900	-600	14.2	14.2	0	442.8088
24	PRGS	02083124	-900	-600	14.2	14.2	0	452.8388

*	AE	RMOD (04300): PR	SHORT-TERM S	O2 IMPACTS USIN	G AERMOD	4300	FOR YEAR	2002
*	MO	DELING OPTIONS	:					
*	C	ONC		ELEV FLGPOL				DRYDPL WETDPL
*		MAXI-FILE FOR	24-HR VALUES	>= A THRESHOLD	OF 3	65		
*		FOR SOURCE GR	oup: PRGS					
*		FORMAT: (1X,I	3,1X,A8,1X,I8	.8,2(1X,F13.5),	3(1X,F7.	2),1X,F	13.5)	
*A	VE	GRP DATE	X	Y	ZELEV	ZHILL	ZFLAG	AVERAGE CONC
*								
24	PRGS	02091024	-900	-600	14.2	14.2	0	383.8004
24	PRGS	02092524	-900	-600	14.2	14.2	0	418.2703
24	PRGS	02092624	-900	-600	14.2	14.2	0	704.556
24	PRGS	02101024	-900	-600	14.2	14.2	0	519.536
24	PRGS	02101324	-900	-600	14.2	14.2	0	374.5938
24	PRGS	02102424	-900	-600	14.2	14.2	0	431.611
24	PRGS	02102524	-900	-600	14.2	14.2	0	428.9936
24	PRGS	02102824	-900	-600	14.2	14.2	0	697.4269
24	PRGS	02102924	-900	-600	14.2	14.2	0	944.7171
24	PRGS	02111624	-900	-600	14.2	14.2	0	604.4473
24	PRGS	02112524	-900	-600	14.2	14.2	0	629.278
24	PRGS	02121024	-900	-600	14.2	14.2	0	537.9667
24	PRGS	02121724	-900	-600	14.2	14.2	0	537.4399
24	PRGS	02122424	-900	-600	14.2	14.2	0	467.5953
24	PRGS	02042124	-900	-500	13.97	13.97	0	586.5397
24	PRGS	02061424	-900	-500	13.97	13.97	0	809.4432
24	PRGS	02083124	-900	-500	13.97	13.97	0	450.8136
24	PRGS	02090624	-900	-500	13.97	13.97	0	380.3428
24	PRGS	02091024	-900	-500	13.97	13.97	0	716.2914
24	PRGS	02092524	-900	-500	13.97	13.97	0	484.956
24	PRGS	02092624	-900	-500	13.97	13.97	0	764.1883
24	PRGS	02101024	-900	-500	13.97	13.97	0	509.2681
24	PRGS	02101324	-900	-500	13.97	13.97	0	366.1598
24	PRGS	02101524	-900	-500	13.97	13.97	0	383.6364
24	PRGS	02102124	-900	-500	13.97	13.97	0	371.8413
24	PRGS	02102424	-900	-500	13.97	13.97	0	596.213
24	PRGS	02102524	-900	-500	13.97	13.97	0	443.7616
24	PRGS	02102824	-900	-500	13.97	13.97	0	716.6278
24	PRGS	02102924	-900	-500	13.97	13.97	0	806.0285
24	PRGS	02111624	-900	-500	13.97	13.97	0	394.8536
24	PRGS	02112124	-900	-500	13.97	13.97	0	379.7242
24	PRGS	02112524	-900	-500	13.97	13.97	0	629.225
24	PRGS	02121024	-900	-500	13.97	13.97	0	628.0831
24	PRGS	02121724	-900	-500	13.97	13.97	0	405.6708
24	PRGS	02122424	-900	-500	13.97	13.97	0	517.9632
24	PRGS	02020724	-900	-400	12.8	12.8	0	395.2107
24	PRGS	02042124	-900	-400	12.8	12.8	0	563.9686
24	PRGS	02042824	-900	-400	12.8	12.8	0	415.3784
24	PRGS	02061424	-900	-400	12.8	12.8	0	995.9813
24	PRGS	02062124	-900	-400	12.8	12.8	0	414.2595
24	PRGS	02071424	-900	-400	12.8	12.8	0	383.1998
24	PRGS	02072524	-900	-400	12.8	12.8	0	394.6633
24	PRGS	02083124	-900	-400	12.8	12.8	0	428.0746
24	PRGS	02090624	-900	-400	12.8	12.8	0	383.3113
24	PRGS	02091024	-900	-400	12.8	12.8	0	986.3595
24	PRGS	02092524	-900	-400	12.8	12.8	0	556.5975
24	PRGS	02092624	-900	-400	12.8	12.8	0	730.4272

